

ARMOR

July-August 1968



"Tyranny like hell is not easily conquered; yet we have this consolation with us, that the harder the conflict the more glorious the triumph."

—Thomas Paine

THE UNITED STATES ARMOR ASSOCIATION

Established 1885 as The United States Cavalry Association

"To disseminate knowledge of the military arts and sciences, with special attention to mobility in ground warfare; to promote the professional improvement of its members; and to preserve and foster the spirit, the traditions and the solidarity of Armor in the Army of the United States"—Constitution.

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ARMOR

The Magazine of Mobile Warfare

Volume LXXVII

July-August 1968

No. 4

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LETTERS TO THE EDITOR

Dear Sir:

I have received my membership packet for 1968-69 and everything seems to be in good order except my membership card. I note that it states I have been a member since 1968, and in a way, this is a bit of a blow for my pride. I have been a member in good standing since 1956 although I will admit that I goofed recently and allowed my membership to expire. I promise not to allow this to happen again, EVER.

We all make mistakes as you know. (For instance, you have misspelled my last name placing two "l's" in it rather than two "e's.") So I will forgive you if you forgive me and in the future we can both try to do better to uphold the zero defects program.

Thank you

Major, Armor

Fort Knox, Kentucky

We will try harder for zero defects. We will try harder, etc., (500 times). Also we will try to see that your membership is never allowed to expire—EVER.

P.S. All is forgiven in view of your check for dues.

EDITOR

The Soviet Battle Tank

Dear Sir:

The article in the March-April issue of *ARMOR* by Lieutenant Colonel Doctor F.M. von Senger und Etterlin on the evolution of the modern Soviet battle tank was very interesting. I hope that *ARMOR* will continue to have more of this sort of article. Although the article was well written, I find that I can not agree with some of the statements made in it.

First, the 100mm gun mounted on the T54/55 battle tank has the same muzzle velocity and caliber length as the 100mm gun mounted on the SU100 of World War II. Of course, the Soviet have probably improved the ammunition and maybe even the tube itself. Nonetheless I do not think that one could call the 100mm gun a major development in modern gun design and performance.

The best armor-defeating projectile in existence today is the APDS type round. This round has the greatest muzzle velocity and penetration when fired from any gun capable of handling it. Von Senger states that, as far as he knows, the Soviets do not have this round in troop use. Here, I am inclined to agree with him. Therefore, since the T54/55 does not have the

APDS round how can it have such great armor penetration capability equal to, or superior to, Western tanks produced prior to 1964? I shall go even further and venture to say that if a T54 and a standard American M48 tank slugged it out the M48 would probably come out the winner.

Secondly, the strategic mobility of the T54 is not greater with respect to range than the standard Western tanks of the period. For example, the M48A2 has a greater range than the T54.

The T54 certainly can not compare with the Patton in armor protection. The Patton has armor plate that can deflect a 100mm round at everything except possibly point-blank range.

Although the Pattons may cost more and take more time per unit to build than the T54/55 series, if you put the two models side by side and told someone to pick the one he would rather fight in, I think that he would pick the Patton as the better all-round.

The British Centurion with the 83.4mm gun firing an APDS round has much better muzzle velocity than does the T54/55 Series. However, in other respects, admittedly, the T54/55 does have an edge.

Although the T54 is lower and does have some better features than the Western tanks used prior to 1964, I believe that overall the Western tanks do have superior firepower, mobility and armor protection. And these are what count toward making the superior battle tank.

DAVE M. MEZOURS

Milltown, New Jersey

Armor Desert Memorial

Dear Sir:

During World War II many divisions, as well as smaller units, trained in California's Mojave Desert. Today the only permanent installation remaining from those days is the U. S. Army Armor Desert Training Center at Fort Irwin.

We are interested in making contact with the associations of any of these Army units as, with the impending dedication of a permanent chapel here, an opportunity exists to memorialize personnel of those units who fell in combat.

RALPH M. HOFMANN
Colonel, Armor
Commanding

Hq, USA Armor and Desert Training Center
Fort Irwin, California 92311

No Automatic Leaders Yet

Dear Sir:

Reference is made to the article on the Swedish battle tank by Richard M. Ogorkiewicz which appeared in the March-April issue. There appears to be a misprint in the article. I refer to the last sentence on page 15.

This, in turn, has made it possible to dispense with the *leader* and thus save a considerable amount of space within the tank, making it more compact still.

It seems to be that the word *leader* should be *loader*.

ERNEST D. PASSERINI

Newark, N. J.

Gremlins in the composing room again. The word should indeed be loader. We do not foresee the day when leaders can be dispensed with. On the contrary, as newer and better equipment is developed, they become more important than ever. EDITOR

Target

Target! is the way we sense LTC Doyle's column in the March-April issue of *ARMOR*.

I am wondering how much has been done to improve the family of armored personnel carriers and resupply vehicles?

I recall that while I was serving with the 3d Squadron, 11th Armored Cavalry Regiment, several suggestions were made to improve the ACAV (M113 APC) which we were using in Vietnam. One was to improve the ballistic protection of the M113 by placing shields three to six inches from the sides of the vehicle. This would provide the necessary stand-off distance required to prevent penetration of some of the smaller antitank weapons. A second suggestion was to install a vehicular compass. The last was from a "Blackhorse" trooper—to equip at least one personnel carrier per platoon with a vehicular mounted mine detector.

I agree with LTC Doyle that the M113 personnel carrier has served us well. However, it has limitations that need to be corrected. Armor today, and tomorrow, needs an all track capability.

Hopefully, it is not too late for the rest of the Army to catch up to the lonesome tank crews.

MSG FRANK DEGARAY
Carlisle, Pennsylvania

PEAT, MARWICK, MITCHELL & Co.
 CERTIFIED PUBLIC ACCOUNTANTS
 840 CONNECTICUT AVENUE, N. W.
 WASHINGTON, D. C. 20036

The Executive Council
 The United States Armor Association

We have examined the balance sheet of The United States Armor Association as of December 31, 1967 and the related statement of income and expenses and Association equity for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying balance sheet and statement of income and expenses and Association equity present fairly the financial position of The United States Armor Association at December 31, 1967 and the results of its operations for the year then ended, in conformity with generally accepted accounting principles.

Peat, Marwick, Mitchell & Co.

March 22, 1968

THE UNITED STATES ARMOR ASSOCIATION

Balance Sheet

December 31, 1967

Assets

Current assets:

Cash:	
Demand deposits	\$ 4,471.67
Savings account	3,821.40
Total cash	10,293.07
Marketable securities, at cost (quoted market \$36,485.63)	29,910.06
Accounts receivable	1,784.09
Inventories, at cost	2,891.27
Prepaid expenses	802.33
Total current assets	46,780.74
Office furniture and equipment, at cost	\$ 7,521.29
Less accumulated depreciation	4,898.22
Net office furniture and equipment	2,623.07
	<u>\$ 49,403.81</u>

Liabilities and Association Equity

Current liabilities - accounts payable and accrued expenses	8.93
Deferred income - dues and subscriptions	26,114.93
Association equity	22,155.95
	<u>\$ 49,379.81</u>

THE UNITED STATES ARMOR ASSOCIATION

Statement of Income and Expenses and Association Equity

Year ended December 31, 1967

Income:

Dues and subscriptions	\$ 37,617.05
Registration fees	133.00
Book, prints, and publication sales	12,496.06
Interest and dividends	1,234.90
Donations	100.00
Total income	<u>\$1,589.00</u>

Expenses:

Armor magazine:	
Producing and delivering	\$ 29,308.26
Circulation	2,058.37
Promotion and advertising	558.51
Stationery and supplies	1,819.15
Total armor magazine	33,743.29
Associations:	
Annual meeting	384.12
Executive Council	207.40
Memorials and contributions	118.18
Awards	1,084.70
Cards, by-laws, and decals	437.00
Total associations	2,231.40
Book department:	
Books, prints, and publications	8,281.67
Postage	282.23
Supplies	133.58
Total book department	8,697.48
General and administrative:	
Equipment rental and maintenance	225.48
Depreciation	343.79
Telephone	694.55
Staff travel and parking	1,969.92
Rent	3,840.00
Other	780.30
Total general and administrative	8,004.04
Total expenses	<u>\$5,446.21</u>
Excess of expenses over income	1,066.21
Association equity at December 31, 1966	22,155.95
Association equity at December 31, 1967	<u>\$ 23,222.16</u>

FINANCIAL HIGHLIGHTS FOR 1967

The Association lost \$1066.21

Expenses per member/subscriber \$6.47

Income per member/subscriber
(less books and investments) \$5.55

ARMOR Magazine lost money because of too small circulation with its current rates and quality

Whether we have 1000 or 10,000 members and subscribers most costs remain the same

We are non-profit but must break even

Income must be increased

Alternatives:

Increase numbers of members
and subscribers

Increase dues and subscription
rates

Best solution:

Every member get more members
and subscribers

The Secretary-Treasurer



**PROCEEDINGS
THE
UNITED STATES ARMOR ASSOCIATION
FORT KNOX, KENTUCKY
9-11 MAY 1968**

THE AGENDA

THURSDAY, 9 MAY 1968

1830 Reception and Buffet at the Brick Mess

FRIDAY, 10 MAY 1968

0800 Honors Ceremony at the Court of Honor

MORNING SESSION AT WAYBUR THEATER

- 0830 Welcoming Address by Brigadier General Charles H. Hollis, Commanding General, U. S. Army Armor Center
- 0835 Keynote Address by Lieutenant General George R. Mather
- 0910 "Mounted Combat in Vietnam" a symposium and discussion presented by the U. S. Army Armor School, Colonel William W. Cobb, Assistant Commandant, Chairman
- 1100 Report on Patton Museum Development by Lieutenant General Samuel L. Meyers, USA-Retired
- 1110 Business Meeting
- 1200 Luncheon at the Brick Mess
- 1400 Demonstration of Armor weapons mounted on tanks, personnel carriers and helicopters, and individual weapons at Dorrets Run Range by The U. S. Army Armor School with participation by the U. S. Army Aviation School and the 8th Squadron, 1st Cavalry
- 1600 New equipment display and fording demonstration at Tobacco Leaf Lake by The U. S. Army Armor and Engineer Board.
- 1845 Cocktails and Banquet at the Brick Mess with address by Major General Edwin H. Burba.

SATURDAY, 11 MAY 1968

0900 Executive Council Meeting at the Brick Mess

THE REPORTS

In this issue of **ARMOR** are presented the keynote address and the symposium and discussion. The September-October issue will have the banquet address and reports on the business and executive council meetings. The Officers and Executive Council elected for 1968-69 are shown on the inside front cover of this issue. Inclement weather precluded effective photographic coverage of the honors ceremony and the excellent demonstrations which included all the latest armor weaponry except the MBT70, the AH56A and the ACV. Details on these were presented through films and displays in the Brick Mess.



WELCOMING ADDRESS

by Brigadier General CHARLES H. HOLLIS
Commanding General, U. S. Army Armor Center

General Waters, distinguished conferees, ladies and gentlemen:

It is with great pleasure that I welcome the Armor Association back to Fort Knox for its 79th Annual Meeting. I am sure that General Surles, our ~~past commander~~, and General Sutherland, our new commander, both regret that they are unable to be here to greet you.

In keeping with our purpose of disseminating professional knowledge and fostering the spirit and solidarity of Armor, it is fitting that the annual meeting be held at the "Home of Armor." For most of you, this is a return visit to a familiar community. I hope that you will enjoy your visit and that you will find that progress abounds. It is our aim continuously to improve men, equipment and doctrine and thereby to assist in providing the combat arm of decision with the necessary tools for adding new pages to the great record that is our heritage.

The theme of this annual meeting is the role of Armor today and in the future. Developments in Vietnam during the past few years have again demonstrated the value of Armor in combat. The trend toward deploying more Armor units to Vietnam points out the inherent flexibility of Armor in meeting any type of challenge.

Later this morning, officers who recently returned from commanding Armor units in Vietnam will relate to you their experiences in present-day armor employment. During these presentations it will become obvious that Armor, in its role of conducting decisive, highly mobile warfare using both ground vehicles and aircraft, continues to be a highly effective ground fighting formation. Furthermore, the tank is, and will continue to be, the dominant ground assault weapon with the greatest battlefield survivability.

From the early days of the horse cavalryman, Armor has possessed an arsenal of the most sophisticated weaponry available. Later you will see some of the weapons and equipment that enable Armor to retain its characteristic ability to gain decisive advantage over any enemy by destroying his forces and his will to



resist. You will also see some of the equipment presently in the development and testing stage.

While we quite naturally emphasize "the only shooting war that we have" let us not forget the worldwide role of Armor, especially in Europe, as we listen to the presentations and witness the demonstrations of equipment and weapons.

Again, on behalf of the officers and men of this command, welcome to The United States Army Armor Center.

The keynote address this morning will be given by Lieutenant General George R. Mather, Commanding General of III Corps and Fort Hood.

General Mather really needs no introduction to this audience. But let me summarize some of the highlights of his distinguished career.

A graduate of the West Point class of 1932 and the Regular Course of the Cavalry School in 1937, General Mather returned to the Academy in 1938 as an instructor of Spanish.

In the early part of World War II, he was assigned to the Operations Division of the War Department General Staff.

He served in combat in Europe as the Regimental Executive Officer, 110th Infantry Regiment, 28th Infantry Division and was seriously wounded in the Huertgen Forest. Thereafter, he returned to the United States in March 1945 and was again assigned to the Operations Division, War Department General Staff.

After the war he served in a number of key assignments including: The United Nations Military Staff Committee, Tank Battalion Commander, Executive Officer of the Armor Board, Chief of Staff of the Berlin Command, Commanding Officer CCB, 2d Armored Division, President of the Army Maintenance Board, with DCSPER in the Pentagon, Assistant Division Commander of the 7th Division in Korea, Chairman of the US Delegation, Joint Brazil-US Military Commission and Chief, MAAG Brazil, CG, 2d Armored Division, and senior US representative with CENTO in Turkey.

General Mather, as you know, has recently commanded both the V Corps in Germany and the III Corps at Fort Hood. He is now Director of Civil Disturbance Planning and Operation, Office of the Chief of Staff, at Headquarters, Department of the Army.

It is my personal pleasure and honor to introduce this distinguished soldier-commander, staff officer, and international planner.



THE KEYNOTE ADDRESS

by Lieutenant General GEORGE R. MATHER

General Waters, fellow members of the United States Armor Association:

It is a real pleasure to be back here at Fort Knox for the 79th Annual Meeting of our Armor Association. I can imagine that it must be equally stimulating and encouraging to our Association President and to our Executive Council to see several hundred members in attendance ready to participate in this program which has demanded much of General Hollis and his people.

Every annual meeting that I have been able to attend over the past 20 years has been held here at Fort Knox. So like many of you, I have come to associate the two together.

I am particularly pleased to see that Fort Hood and its two Armored Divisions are so well represented at this meeting.

This 79th meeting of our Association is especially significant coming as it does in the midst of events in Vietnam and Korea, in the aftermath of the Arab-Israeli War, in the continued importance of our presence in NATO and even in the light of the recent internal civil disorders which occurred in our country last month and which still threaten. These trying times provide us a provocative background for this year's meeting which, as it should be, is clearly focused on professional concerns. To put it in simpler terms, the times provide us a setting in which to consider and to discuss our primary stock in trade which is so well defined in our Association's Constitution—the fostering of mobility in ground warfare.

So my remarks this morning will be cast in this framework and they will be slanted primarily toward the younger members of this audience. They also have application to all of us who have the tremendous responsibility for perpetuating in these younger members the spirit, the traditions and the know-how that we

older leaders have learned and inherited in turn from our distinguished predecessors.

To the extent that we are successful in inculcating these young leaders, officer and noncommissioned, with the more tangible characteristics of the Armor leader, so will they be more apt to acquire and master that more intangible trait which has always distinguished the leader of



Armor—his mental mobility, his mental flexibility and his mental agility.

And I am going to dwell on this thought for just a moment before going on to other matters because of its consummate importance to Armor and to how well we do our job. I stress this thing of "mental flexibility" as an attitude as well as a characteristic because it is this mental posture, this mental approach on the part of the Armor leader which gives him the capacity to act so inventively in the face of the unexpected. It is a state of mind that permits him to improvise with boldness and daring—but a daring which is underwritten by deep, continuous and patient calculation and which includes no element of recklessness.

For success in the test of battle is not realized by that type of daring in which action precedes thought or where it stems from emotion rather than reason. Originality, innovation, informed boldness and daring—plus, of course, a stomach for adversity. These were the attributes of our Armor leaders who made Armor famous in World War II and in Korea and which have given Armor a significant role in our operations in Vietnam.

We all know that for a long time now, the myth that whole areas of difficult terrain preclude the use of ground combat vehicles—and thus are "off limits" to Armor—has been exploded.

Seventeen years ago in Korea armored units demonstrated their versatility. And French and Vietnamese armor formations continually proved of great value in Indochina long before the American involvement in that area.

It is interesting to note that the report of the Mechanized and Armor Combat Operations in Vietnam Study Group observes that in this inhospitable environment, tanks can move with organic support in about 60 percent of South Vietnam during the dry season—and in about 45 percent of the land during the monsoon season. The M113 can move effectively over 65 percent of the land area year around.

Experience in South Vietnam's Delta has shown that there is no canal that the M113 cannot cross—and little terrain it cannot negotiate. Field expedients and modifications to vehicles enable them to cross water obstacles and to assist like vehicles in battlefield recovery operations.

Today, in Vietnam, roads are cleared, convoys secured, and outposts relieved, resupplied and reinforced by armored cavalry. Here in this difficult terrain most of the routine missions of mechanized cavalry



are being carried out.

The great variety of enemy threats and the frequent necessity to provide support for the infantry have confirmed the very real need for armored formations in Vietnam in spite of terrain limitations.

In Vietnam, our mechanized units vary in size from individual tank companies and armored cavalry troops to an armored cavalry regiment.

Armor forces there today include: tank battalions, air cavalry squadrons, armored cavalry squadrons, separate armored cavalry troops, and an experimental air cushion vehicle test unit.

It goes without saying that all types of military organizations have been required to accept some adaptations to the environment in Vietnam, and the mounted arm is no exception. But Armor is there in considerable strength and doing a fine job thus proving that our Armor assets are more than worth their salt.

been largely adopted throughout the Army. All of us here can take a vicarious pride in the knowledge that Armor set the pace for others to follow.

All of this, of course, is an outgrowth of, and directly attributable to, the flexibility which armored divisions demonstrated in battle in the Second World War.

From Europe we can travel again to the other side of the globe. And, there in Vietnam, find in the organization for combat of the new air-mobile cavalry division, mobile concepts from the mind of General Hamilton Howze—one of our most accomplished and distinguished advocates and practitioners of mobile warfare.

Many of you, I am sure, have read his thought-provoking article on "The Mobile Branch" in the January-February issue of our magazine—ARMOR. In this article many organizational and operational concepts are proposed which have stimulated

form of more subscriptions than it's currently getting. For all of us, this is an important periodical—and it warrants our full support.

With respect to personnel, we in Armor, like all of the combat arms, find ourselves with a shortage of captains and majors in our organizations. Most of our squadrons and battalions have lieutenant colonels in command, but no majors, few captains, and, as I've heard said, "wall-to-wall" lieutenants. And this brings me back to something I mentioned earlier in another context—the tremendous challenge and responsibility which lies on the shoulders of the battalion and squadron commanders and their superiors to impart their know-how and expertise to the fine young lieutenants who provide our main officer strength.

I believe this to be one of the greatest challenges confronting the battalion, brigade, regimental, division and corps commanders today—the preparation and training of these

These trying times . . . provide us a setting in which to discuss our primary stock in trade—the fostering of mobility in ground warfare.

For this success in Vietnam we must give credit to the ingenuity of our Armor leaders on the scene. And we must give due recognition to them for their imaginative development of new techniques—new tricks of the trade—which would be applicable to many other parts of the world.

We can look, too, at what might be considered as the more traditional role of Armor as the major mobile battle formation operating in the temperate land masses such as Germany.

Certainly a tremendous role and challenge remains for Armor in Europe today. And in that theatre, it is interesting to note that few distinctions now exist between the infantry division and the armored division—except, of course, in the relative weights of armor and infantry within each division. For the Armor concept of the organization of a division for combat has now

the thinking of Armor officers and noncommissioned officers throughout the Army.

And, while I'm at it, let me toss a bouquet to Colonel Martin and his staff at ARMOR Magazine for the fine job they are doing in getting out this journal that makes such good reading and is also professionally rewarding.

ARMOR is our magazine. It's not an official "house organ," but, rather, it is a professional journal published by and for our members. It is the only one of its kind in the world, and thus, enjoys a world-wide audience including, I understand, the Soviet Union which has reprinted quite a few of our articles in their Red Army's top professional journal.

ARMOR is the sole magazine that allows those in the Active Army, the National Guardsmen and the Army Reservists to keep abreast of current Armor thinking and developments. It deserves better support in the

junior officers of the combat arms, most of whom go on to service in Vietnam.

And, from what I have been able to observe for the past two and a half years as a corps commander both in Europe and here in the United States, this job is being done, and in the best traditions of the service. Our senior commanders are measuring up to the challenge and the young lieutenants are able to shoulder responsibilities far beyond their rank and experience. And, they are doing this with a self-confidence and an enthusiasm that warms the cockles of the heart.

In this connection, an area that deserves, and continues to get, a lot of attention from higher up is the continuing effort to reduce the heavy administrative burden that the company or troop officer must bear. That this burden is onerous and out of all proportion to the time he can devote to his primary task of train-



ing and preparing his unit for its tactical mission has long been recognized. That the company commander is now usually a second or first lieutenant instead of a relatively experienced captain has only accentuated the need for relief.

Since the close of World War II, the Army has been making great strides toward modernizing its supplies and equipment in order to keep abreast of the many technological advances that have occurred in all fields of science.

To manage properly this modern Army, a voluminous amount of data is required at all levels of command. Particularly at the highest. This added requirement for useful management data at higher levels causes a snowballing effect at lower levels.

People at the battery, company, and troop level are responsible for the condition and effective use of their supplies and equipment. Therefore, the gathering of data starts at the user level—mostly through the

matic data processing usage within the division which holds so much promise for the future.

The Brown Board made a series of recommendations with the prime purpose of reducing the unit commander's administrative and logistic workload. These recommendations were field tested in the Division Logistics System Test Program—or DLST—which has been conducted at Fort Hood over the past year.

Of the 25 individual tests in the DLST, the most far-reaching have been in the field of automation within the division's logistic setup. This also is the area which holds the most promise for us to help ourselves in relieving the company commander of his administrative burden. Thirteen of these tests involve automation of the logistic system within the division. This includes automation of the property book, Army equipment status and asset reporting and the Army equipment records system.

(or CS-Sub-Three) Test.

The Combat Services Support Test is designed to automate extensive logistic, personnel and administrative functions through the use of a modern, sophisticated, third-generation computer. The first set of this computer, the IBM 360-40, has just been delivered at Fort Hood. By the end of the summer, the III Corps will have three such computers and will be operational under the CS-Sub-Three concept.

Other systems of automation are being tested throughout the Army in an effort to make the Army more responsive to its own needs, and to lessen and simplify the administrative and logistic workload. So, all in all, it now appears that we have reason to hope that relief will be forthcoming for our hard pressed company level leaders.

I'm going to use this optimistic note to bring my remarks to a close.

However, I do want to thank General Waters again for this opportu-

*We in Armor always seek . . . to keep ever ready aggressively led
armor formations for the variety of contingencies
which may be encountered.*

use of grease-covered forms and stubby pencils. As a result, the junior officer has been required to devote more and more time to forms and reports rather than to developing his leadership qualities.

This trend has been recognized by our senior leaders and has caused so much concern that in August 1965, The Chief of Staff of the Army, General Harold K. Johnson, called Lieutenant General Frederic J. Brown back to active duty to head the Department of the Army Board of Inquiry on Army Logistic Systems—now commonly referred to as the Brown Board. It is interesting to note that General Brown was during that time President of our Association.

All of us owe a vote of thanks to General Brown for his enlightened work in trying to define this problem and in the development of auto-

Also being tested is the concept of developing a division data center for centralized processing of personnel, finance, and logistical data, and the preparation of the many reports required. The division tests combined the automation of personnel and finance accounting with the logistical applications. For these tests two UNIVAC 1005 machines with the necessary peripheral equipment were used.

Automation of the logistic functions together with the personnel and finance functions will, hopefully, result in taking a greater part of the administrative burden away from the junior officer, so that he can spend more time on his number one job.

In addition, these division tests provide a basis for development of future doctrine to be integrated into the Combat Services Support System

nity to keynote the 79th meeting of our Association and to wish you a successful and rewarding session both professionally and socially. I am particularly grateful for the opportunity this visit has given me to see many of our younger Armor leaders and to renew some old friendships. Moreover, I am happy to see so many of our old pros present.

We in Armor always seek and welcome advice and counsel from our elder statesmen. This, together with an informed input from the Active Army and the Reserve Components, provides the realistic guidance with which to carry through our tasks and to update our plans to keep ever ready aggressively led armor formations for the variety of contingencies which may be encountered in the future; and, most importantly, to ensure that Armor remains the Combat Arm of Decision.



MOUNTED COMBAT IN VIETNAM

by Colonel WILLIAM W. COBB

former Commanding Officer, 11th Armored Cavalry Regiment

General Waters, Gentlemen:

It is indeed an honor and pleasure for me to introduce this panel discussion on the "Role of Armor in Vietnam," or, as we have elected to call it, "Mounted Combat in Vietnam."

This symposium will begin with several short presentations by recent Vietnam returnees, all commanders. The purpose is to show the role of Armor or mounted combat in Vietnam, and to show that that role is a decisive one. Following the presentations, the presenters will sit as members of a panel, prepared to take your questions, to elaborate in more detail, or to participate in the discussion, as you wish.

First, I would like to review the history of mounted combat by United States Army forces in Vietnam. In the early days of American involvement, it was believed by some that Armor units were not suited to the terrain in Vietnam, nor the enemy, nor the area-type warfare associated with counterinsurgency operations. Those who held such beliefs maintained that Armor units would play an insignificant role if ever employed. As we look back a couple of years, we see that these beliefs have not been substantiated.

In the past two years, there has been a marked increase of Armor units in our force structure in Vietnam. The first substantial build-up was marked by the arrival of the 11th Armored Cavalry Regiment in the fall of 1966. Prior to that time, mounted forces in-country consisted of six battalion-size units—tank, armored cavalry, mechanized infantry and air cavalry. Today, there are twenty-two such battalion-size units operating throughout South Vietnam. This increase has been brought about primarily by two factors.

First, the nature of the enemy, which has changed from small guerrilla units to well-trained and well-equipped North Vietnam (or NVA)

regiments and divisions. The regular forces still rely on the ambush and other guerrilla tactics. However, they also use more conventional tactics with massed firepower and increased use of antipersonnel mines and modern small arms. Hence additional Armor units, with their inherent protection against small arms and antipersonnel mines, and their mobility and firepower were needed to gain a tactical advantage.

And second, the mounted formations launched against the enemy in 1966 and early 1967 had achieved



noteworthy results. Consequently, field commanders began requesting and even demanding mounted units.

Under the direction of Major General Arthur L. West, Jr., The Mechanized and Armor Combat Operations, Vietnam Study, commonly called "The MACOV Study," was completed in the spring of 1967. This further substantiated a role for Armor in Vietnam. The study concluded that although the enemy, area warfare, and terrain were different from the more familiar forms of combat, the doctrine, organization, and equipment of our mounted units remained valid, and that tactics and techniques

were being modified or changed to fit the requirements of area warfare. The study further concluded that although weather and terrain in parts of the country did restrict the mobility of certain types of equipment and organizations, some forms of mounted combat could be used effectively in most areas and under most weather conditions.

Mounted combat units have traversed a major portion of South Vietnam. In those areas where tanks and armored cavalry have been restricted, air cavalry has completed the coverage. To illustrate, let's look at each of the four corps areas.

In the I Corps Tactical Zone the majority of the area consists of the highland region, which generally restricts mounted operations to air cavalry. However, ground mounted units have enjoyed considerable success in the coastal areas and valleys. Air cavalry and armored cavalry have also teamed up in numerous operations against elements of the NVA forces and have inflicted heavy losses.

In II Corps, along the coastal plains, outstanding results have been achieved with combined arms teams composed of air cavalry, tanks and mechanized infantry. The tanks and mech infantry were especially effective when fighting in the hedgerows and in the fortified villages and hamlets. In the plateau region, tank and armored cavalry units successfully opened and secured major communications routes such as Highways 14 and 19.

I shall skip down to the IV Corps Tactical Zone and come back to III Corps later. It is generally accepted that tank operations are restricted in the Delta of IV Corps. However, it was here that the ARVN forces tested the M113 and here it gained its reputation. Back in 1963, the ARVN forces ran acceptability tests of the M113 and since that time they have conducted mounted operations



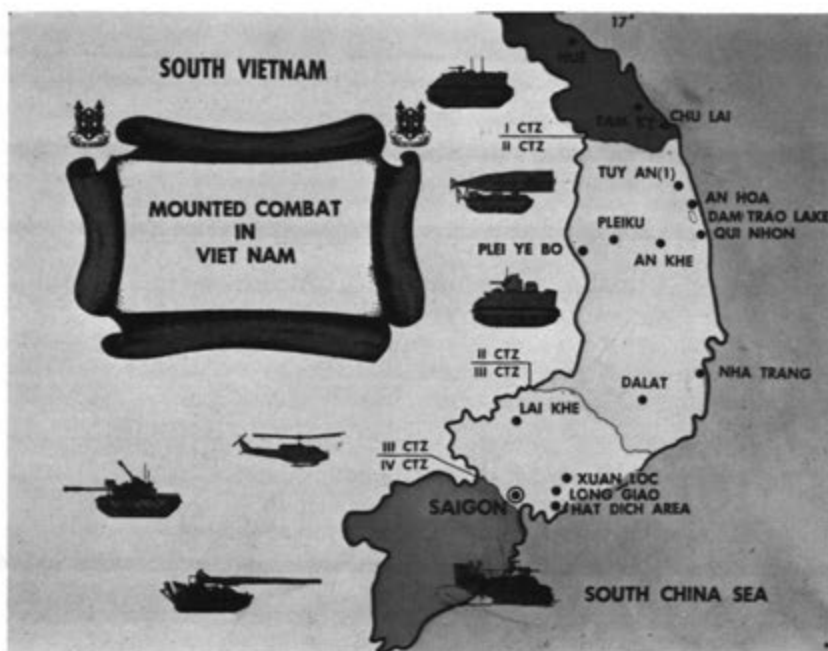
throughout a large portion of IV Corps.

It was here also that some of the armament and armor additions, which resulted in the modified M113 (commonly called the armored cavalry assault vehicle or ACAV) began to emerge. The ACAV has two M60 machineguns with gun shields, and armor protection for the .50 caliber machinegunner. This is the configuration used by the armored cavalry units as a mounted fighting vehicle, not as a personnel carrier.

In the III Corps area, we find the piedmont, which is better suited for ground mounted combat. It contains the much-publicized War Zones C and D and the Iron Triangle. This area has been the battleground for some of our largest mounted operations.

Three operations in which the 11th Armored Cavalry Regiment participated last year portray that Armor is conducting operations similar in many respects to those experienced in previous conflicts. And, equally important, these examples show that Armor is being assigned Armor roles. However, you will note that the cavalry has taken on more extensive offensive operations than it has the traditional reconnaissance and security missions.

Operation CEDAR FALLS is an example of the employment of an armored cavalry regiment in an Armor offensive operation. The 11th Armored Cavalry was assigned the



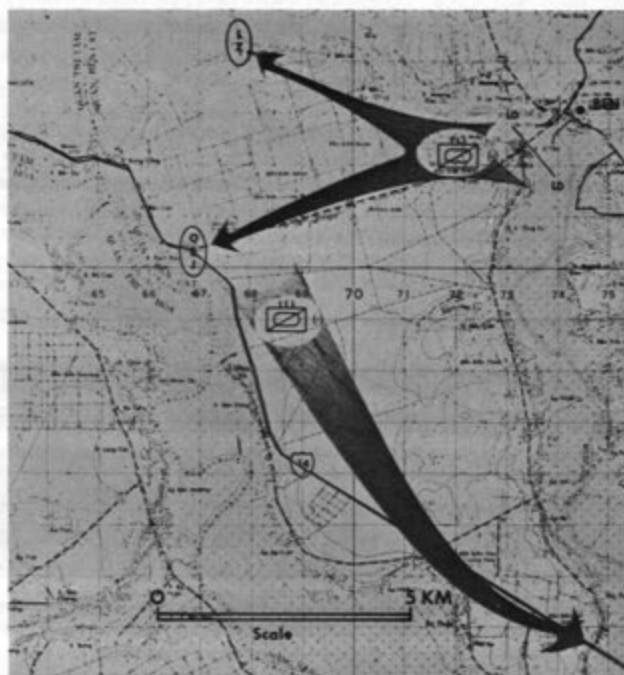
mission of rapidly cutting the Iron Triangle and linking up with other elements conducting heliborne assaults. Thereafter, the regiment extended its operations by driving to the southern tip to cut off and destroy the enemy and his installations.

In operation JUNCTION CITY conducted in War Zone C, the regiment attacked on three axes in a rapid advance to seize objectives near the Cambodian border and link up with heliborne forces. Although initially movement was slowed by terrain, antitank mines and enemy resistance,

the squadron on the east covered 20 kilometers in the first day to secure its objective by nightfall. Subsequent missions during this operation resulted in mounted sweeps sealing off segments of the Cambodian border while the cavalry and infantry units conducted search operations.

Armor doctrine has not changed because of area warfare, however, techniques and methods have. Operation MANHATTAN, conducted south of the Michelin Plantation, is a good example. The regiment attacked on two axes to seize blocking positions,

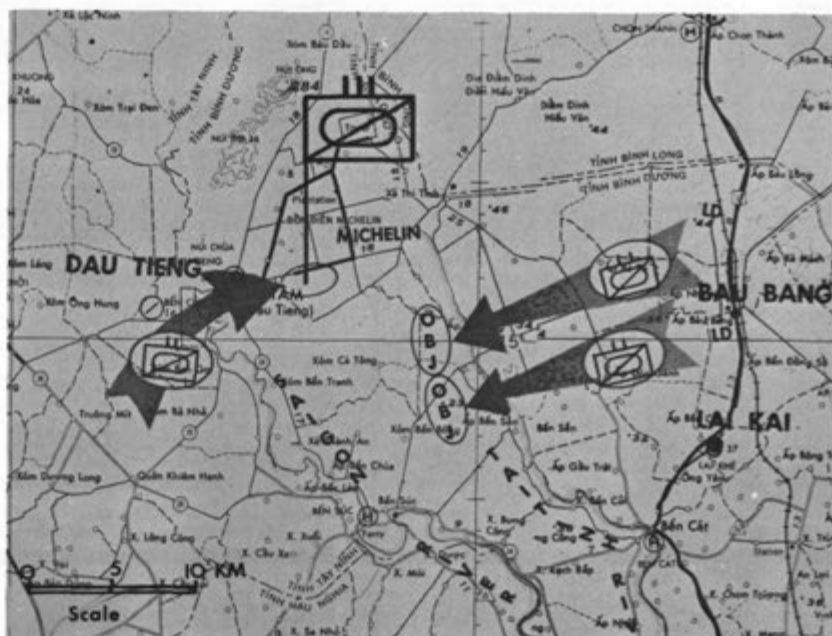
Maps of Operation CEDAR FALLS (left) in January 1967 and Operation JUNCTION CITY (right) in February-March 1967.





conducting a hasty river crossing enroute. This was considered conventional. However, the unusual aspect was the positioning of artillery, the reserve, the regimental command post, and the regimental trains forward of the line of departure.

Many of the mounted combat operations in Vietnam, however, have been of smaller scale than these. In some cases, the Armor units have been in a combined arms or infantry supporting role. The presentations to follow will describe operations from battalion or squadron down to platoon size. Each will illustrate some of the basic traits of Armor—mobility, flexibility, and firepower. I hope that they will leave you with the knowledge that the pendulum has swung from little or no mounted combat to a point where its contribution represents a very real part of the Army's total combat power in Vietnam.



Operation MANHATTAN in April 1967

THE ARMORED CAVALRY-- A QUICK REACTION FORCE

by Lieutenant Colonel MARTIN D. HOWELL

former Commanding Officer, 1st Squadron, 11th Armored Cavalry

In the latter part of October 1966, my squadron, the 1st of the 11th Armored Cavalry Regiment, was operating east of Xuan Loc along Highway 1 and along Highway 333. We were part of an overall regimental operation which was designed to search the area surrounding Xuan Loc, thereby assisting to secure the regimental base camp being developed 12 kilometers south of Xuan Loc.

On 23 October the squadron was spread over a 50 square kilometer area. Shortly before 1000, I received a warning order from Colonel Cobb, the regimental commander, to hold in place and to be prepared to move to Lai Khe to help the 1st Infantry Division, then on Operation ATTLEBORO. This warning order was followed at 1000 by the order to move. During this movement we passed through the area near Chui Chanh mountain, which on 2 December had been a flaming ambush. However, during that battle, Captain Landry, commanding officer, Troop B, lost not a single man while killing over 100 VC to include three battalion

commanders and four company commanders.

By 1100, Troop A, commanded by Captain John Bailly and with

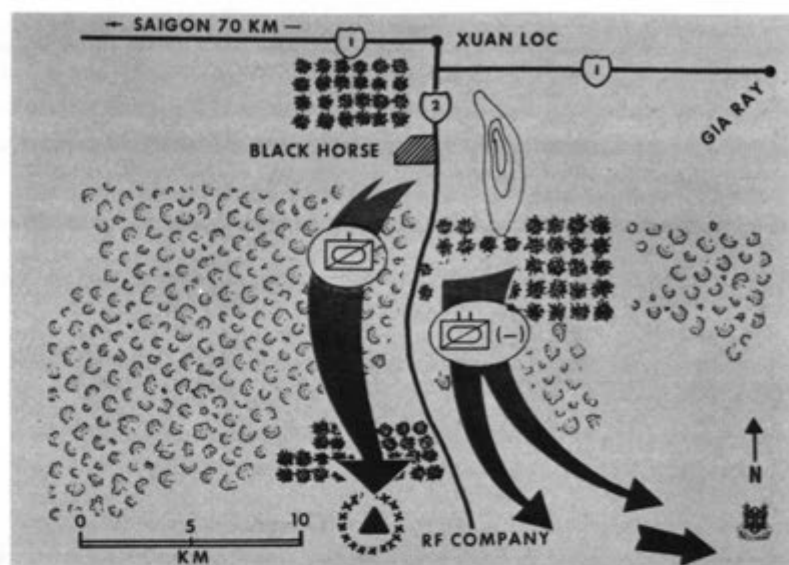


Sergeant John Fomero in the lead, had cleared Xuan Loc and was heading west on Highway 1 toward Bien

Hoa (here again, the squadron passed through an area which was destined to be a battleground on 21 November subsequent to ATTLEBORO).

Captain Bob Garret, commanding officer of Troop C, had a platoon escorting a convoy of trucks which was ambushed by the 274th Main Force Regiment. When the smoke had cleared, 38 of the 274 enemy were killed, while we lost four of our finest. It might be noted this was the first major action of the regiment. We learned our lessons well. This was verified on 2 December.

Although the routes traversed by the squadron enroute to Lai Khe were relatively secure, especially in the Saigon-Bien Hoa area, we still lost considerable time because of heavy civilian traffic and because of a number of small engagements with snipers between Di An and Lai Khe. Nonetheless, seven and one-half hours after the First of the Blackhorse was ordered to move, the squadron closed into Lai Khe. The distance traveled was 185 kilometers. This display of flexibility cannot be measured in time and dis-



The Hat Dich battle.

tance. More important is what you have when you get there. We had over 1100 fighting men, headquarters troop, three armored cavalry troops, our tank company, and our howitzer battery, all fully combat loaded and ready to fight with enough fuel, food and ammunition for 72 hours. This combat power, generated at a specific point on the battlefield, could not be matched by any comparable unit to include an airmobile brigade.

The foregoing was not an isolated example. The spirit of mobility soon became inbred in all our junior officers and noncommissioned officers. Their overriding desire was to capitalize on our mobility in getting to and defeating the enemy.

Another example of spontaneous reaction occurred in the latter part of July 1967, when the First of the Blackhorse was commanded by Lieutenant Colonel Holt. The Phouc Tuy province government had positioned a newly organized regional force (RF) company at Slope 30 to assist in restoring security to the Hat Dich area. Within days after the company established a perimeter defense, a battalion from the 275th Main Force Regiment attacked the position on a dark moonless night. The 1st Squadron, performing base camp security, was ordered to move south to reinforce the RF company. The distance did not exceed 15 kilometers and was not a major factor. However, through past experience, it was known that Highway 2 would be mined. Colonel Holt decided to move cross-country on two axes. The terrain was a combination of rubber

and scrub jungle. As the squadron cleared the base camp, a report came in that the VC had penetrated the wire of the RF unit.

From a cold start the first cavalry element reached the compound within 35 minutes. As one troop secured the compound, the remaining elements of the squadron pursued the enemy. They declined combat. By instantaneous reaction, the Blackhorse was credited with saving the regional force company.

A more recent example of mobility and flexibility occurred during the Tet offensive. Prior to the intensification of hostilities, the 3d Squadron, 4th Cavalry, commanded by Lieutenant Colonel Glenn Otis, was

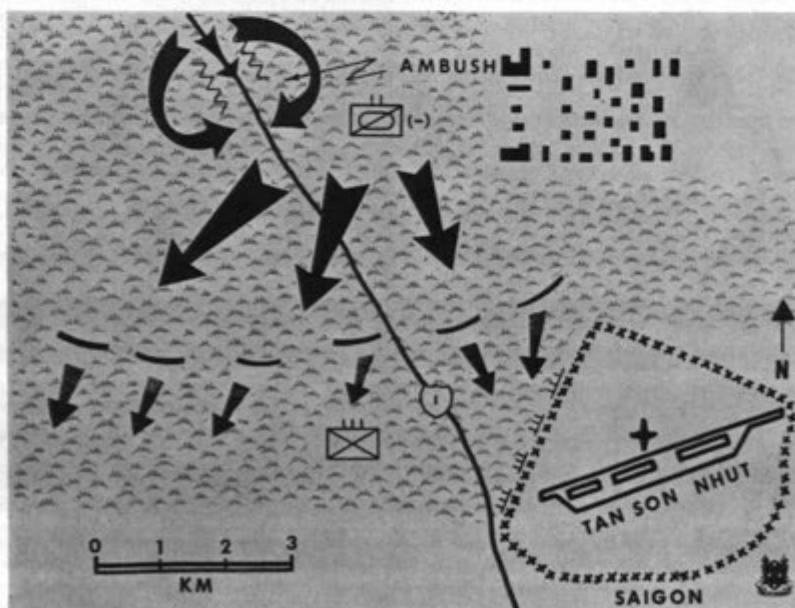
conducting daily security operations along Highway 1.

On the morning of 29 January 1968, the squadron was spread over 40 kilometers with Troop C in base camp at Cu Chi performing maintenance. The hostilities in and around Saigon became intense, and heavy enemy pressure was exerted on the Tan Son Nhut security force and in the area to the northwest of the airfield. At approximately 0730 the squadron was ordered to move available units toward Tan Son Nhut. Reacting instantaneously, the squadron commander moved Troop C out of Cu Chi, to be followed by B and A troops.

At 0830, the lead platoon of Troop C was ambushed 6 kilometers north of the airfield. The squadron minus, maneuvered around the ambush and to the south. It was, in fact, in the middle of a VC regiment. This marked the beginning of a fierce battle. General Johnson, Chief of Staff of the Army, during a recent visit here at Fort Knox, credited this squadron with saving the airfield in this action. Over 400 enemy were killed within the first 24 hours of this battle.

The three actions described are typical of mounted operations being conducted in Vietnam. A unit may have the necessary firepower and armament, yet it can be completely ineffective unless it has the ability and capability to move to the decisive place on time and with the combat power to defeat the enemy. This armored cavalry can do.

The battle northwest of Tan Son Nhut.





THE SECOND BATTLE OF BAU BANG

former Platoon Leader, 3d Squadron, 5th Cavalry, 9th Infantry Division

The second battle of Bau Bang on 19 and 20 March 1967 illustrates the mobility of Armor, even at night and under fire, the effects of organic and supporting firepower and the protection afforded by Armor.

On 19 March 1967, Troop A, 3d Squadron, 5th Cavalry returned to squadron control from operations to the north with the 1st Battalion, 2d Infantry on JUNCTION CITY. Upon its return, it assumed the mission of securing a 10 kilometer section of Highway 13, security of a fire support base located 11,000 meters north of Lai Khe and occupation of a mounted combat outpost 2000 meters north of the fire support base.

During the night of 19 March, Troop A was defending the fire support base perimeter with two platoons. My platoon, the 3d, was responsible for that part of the perimeter on the east from 2 o'clock to 6 o'clock. The 1st platoon was responsible from 7 o'clock to 11 o'clock on the west. The 2nd platoon was north on the combat outpost. Inside the perimeter were the troop headquarters section and Battery B, 7th Battalion, 9th Artillery.

My platoon was on normal 50 percent alert when, at 2300, bursts of heavy machinegun fire were received in the northeast sector of my perimeter. My northern tank immediately engaged and destroyed the machinegun. One trooper was slightly wounded. During the next hour, no VC activity was visible, but the troop commander employed preplanned defensive artillery concentrations to the east in an effort to interdict possible enemy routes of retreat or reinforcements. I directed my platoon to conduct reconnaissance by fire and to use infrared scanning with the tank searchlights.

At 0030 on the morning of 20 March, the VC unleashed a coordinated attack along the perimeter using mortars, automatic weapons, antitank rockets and recoilless rifles.

We responded immediately with a heavy volume of our own and supporting artillery fires. Additional armed helicopter and flareship sup-



port was requested and received. The VC continued to press the attack heavily, taking advantage of the broken and rutted terrain to move large numbers of antitank weapons in close to our perimeter. In the early stages of the battle, many vehicles took direct hits from mortar and antitank rounds, but continued to fight effectively. Fifty-seven 75mm recoilless rifles and RPG2s were used against us. Half of my platoon (18 men) were wounded. Two vehicles from the 1st platoon, an M113 and a 106 mortar track, were hit. Subsequently these exploded and burned with all ammunition aboard. We were able to place a continual heavy volume of effective fire on the attacking enemy forces by using our tank mounted searchlights and firing our own mortar illumination to light the battlefield.

To fill the gap of 150 meters created by the destruction of the two vehicles, the troop commander together with the troop headquarters section moved to the area, killing and repelling the enemy who had penetrated the perimeter. The

2d Platoon returned to the fire support base, and as it closed on the perimeter, it shot its way through the attacking enemy forces. It then reinforced the southern sector relieving the headquarters section of this responsibility. Through the unrestricted use of gunships and supporting artillery and with the arrival of the 2d Platoon we were again able to secure our position.

At 0245 we received a reinforcing platoon from Troop C. That platoon reinforced the southwestern perimeter after fighting its way through an ambush north on Highway 13. At 0300 we received one additional platoon from Troop B which attacked north up Highway 13 through an ambushing VC force, which it destroyed. Racing through the ambush, this platoon continued the attack, catching the main VC attack from the rear. Driving toward our perimeter, it succeeded in splitting the enemy and destroying the initiative of their attack. This platoon created confusion in the enemy ranks and inflicted heavy casualties. When the Troop B platoon got within the perimeter, I directed my platoon and the reinforcing platoon to conduct a limited counterattack to regain the original line of defense.

Also at 0300, TAC Air was employed against the attacking enemy. It succeeded in destroying the enemy in covered and concealed positions to a depth of 800 meters from the edge of the battle area. From this time on, the perimeter was never again seriously threatened. Contact on the perimeter ceased at 0600.

By 0700 the VC body count around the perimeter was 228 confirmed. Final body count after three days of search missions was 363 confirmed. We took seven prisoners who reported an estimated 700 to 800 VC killed. We lost five killed and 63 wounded of whom 28 required hospitalization. Three artillerymen were slightly wounded by fragments.



Forty-two sorties of air strikes, in which one F100 and its pilot were shot down by ground fire, and five cavalry platoons were involved in the action. Some vehicles were hit

as many as 15 times, but continued to fight.

The rapid reaction and reinforcing capabilities inherent in armored cavalry units, and the massive fire-

power organic to them, reinforced by air strikes and artillery made it possible for us to rout completely the reinforced 2000 man 273d VC Main Force Regiment.

AIR CAVALRY FIND AND FIX OPERATIONS

by Lieutenant Colonel ROBERT H. NEVINS, JR.

former Commanding Officer, 1st Squadron, 9th Cavalry, 1st Cavalry Division

First light on 28 June 1967 found the scout elements from all three air cav troops of the 1st Squadron, 9th Cavalry conducting extensive, low-level reconnaissance. We were looking for major elements of the 3d NVA Division which had been badly mauled by the 1st Air Cavalry Division in several major engagements throughout the division's area of operations during the period 19-25 June.

Troop C was generally oriented on the 1st Cav's 2d Brigade area of operations (AO) with emphasis on the Dam Trao Lake. Its mission was to find and fix elements of the 18th NVA Regiment which was believed to be moving around the lake towards base camp and retreat areas in the rugged Cay Giép mountains to the north.

The 2d Brigade was charged with providing an airmobile reaction force to react to any contact developed by elements of the 1/9 Cav in their AO. I had Troop D (the ground cavalry troop) (minus) organized as airmobile infantry for employment as the squadron quick reaction force.

At 0740 a Troop C scout team approaching the village of An Quang from the south at 50 feet and 40 knots detected what its members determined to be several NVA packs partially concealed beneath the palm trees. They also noted evidence of recent extensive digging and bunker repair work. An unusual number of Vietnamese immediately started to depart the village to the east and south. Although they presented themselves as tempting targets, the scouts drew no fire.

At about 0755 the scouts sent this information to troop operations in a spot report, which was monitored by the troop commander, who was in the air nearby, and by myself, in the

air 30 kilometers to the northwest. We both headed toward the area. Enroute, the troop commander ordered his aerorifle platoon, some 15 kilometers to the northwest, to "saddle up."

The "Blues," as the aerorifle platoons were commonly referred to, were air assaulted into the south end of An Quang at 0810 to have a look



at the recently reported activity. They deployed and moved into the village. Almost immediately, they noticed signs nailed to the trees which welcomed the NVA to the village.

At 0817, the Blues were met by a fusillade of heavy automatic weapons fire from an enemy in well-concealed and heavily fortified bunker positions. Fortunately, they sustained no casualties as they took cover behind a hedgerow and returned the enemy fires. The troop commander and his chase gunship 50 feet overhead engaged and killed several NVA soldiers at point blank range 15 to 20 meters in front of the Blues.

After this brief encounter, the troop commander called for the first element of the 2d Brigade's reaction force—the 1st Platoon, Company B, 2d Battalion, 5th Cavalry. They were inserted in a blocking position to the north at 0926.

I had arrived on the scene in time to assist in the insertion of this platoon. On the first low-level pass, we received heavy fire and observed and engaged approximately 20 NVA soldiers moving towards fortified positions in the northern edge of An Quang. We killed several and the 1st platoon, B/2/5 was in heavy contact as soon as it hit the ground.

I became curious about the village of An Hoa about 300 meters to the north. I suspected that with all the activity in An Quang, the NVA might also be located there. On my first low-level recon pass over the village, my suspicions were confirmed. We were met with intense fire, sustained several hits, and observed and engaged numerous NVA soldiers heading for their fortified positions. I quickly concluded that the place was loaded. Most civilians, by this time, had evacuated both villages.

In a brief conversation with the 2d Brigade commander, I reported what I thought to be at least two companies and probably a battalion in the two-village complex and requested release of B Company (—) 2/5 to 1/9 Cav squadron control to block off An Hoa to the north. Also I alerted my Troop D (—) for employment to reinforce the C Troop Blues in the south. D Troop (—) was inserted at 0940 in the south and B (—) 2/5 north of An Hoa at 1050.

At this point, a discussion between myself, the brigade commander and the division commander resulted in a decision to employ the remainder of the 2/5 Cav to seal off the village



to the east. The 1st platoon, Company A, 1st Battalion, 69th Armor, was ordered to move to the contact area. Upon insertion of A and D companies, control of the action was to pass from 1/9 Cav to the CO, 2/5 Cav. D Troop (—) with the C Troop Blues OpCon would be further OpConed to the 2/5 Cav. Aeroscout and aeroweapons elements of my squadron would continue to screen the contact area, provide close-in fire support, and control the artillery and air in close coordination with the 2/5 Cav. I passed control to the CO, 2/5 Cav at 1134.

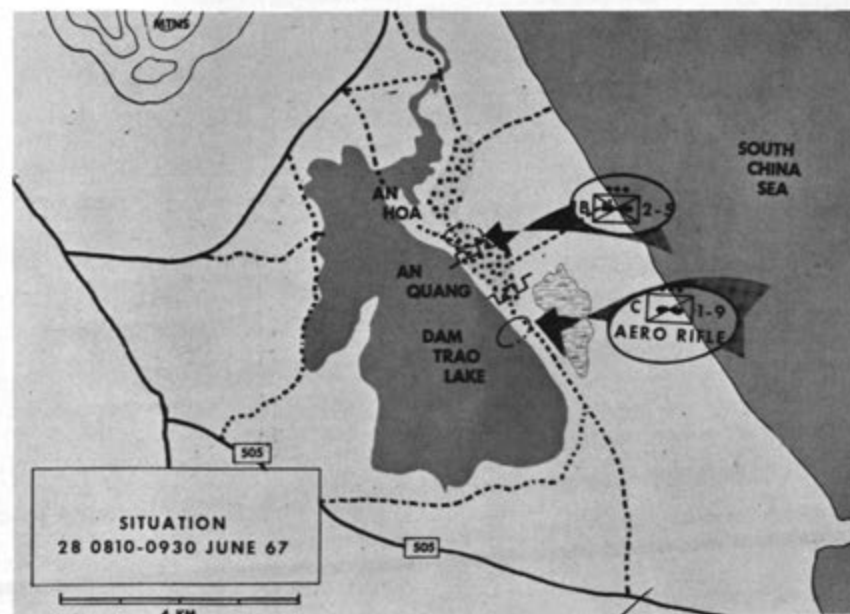
After arrival of the 69th Armor tank platoon, a coordinated attack was launched by Company B (—) and Company D 2/5 Cav at 1530. The attack was stopped cold by a tenacious enemy fighting from well-concealed, heavily fortified bunkers, snipers tied in trees, and antitank fire from 57mm rifles and RPG2 rockets.

At 1830 the decision was made to withdraw B Company (—) and D Company from An Hoa, extract the platoon of B Company under cover of darkness from its vulnerable position between the villages, to cordon off the two-village complex that night, continue to pound the area with artillery and air, and to launch a tank supported attack through the two villages from north to south the next morning.

Throughout the night of 28-29 June, the enemy attempted to exfiltrate the contact area. They were stopped cold on several occasions on the south and east in the areas of D Troop, 1/9 Cav, and A Company, 2/5 Cav. They did succeed in exfiltrating some of their force to the north using the shallow water course on the northeast end of Dam Trao Lake.

After an extensive artillery and air preparation, the attack by the 2/5 Cav supported by tanks was launched at 0630 on 29 June. It was successfully concluded at 1430 when the attacking force closed on the blocking position held by D Troop (—), 1/9 Cav.

The more significant results of this action, now referred to as the battle of Dam Trao Lake, were 84 enemy by body count were killed, all members of the 9th Battalion, 18th NVA Regiment. However, prisoners captured in the contact reported that over 150 were killed and over 100 wounded of a total force of 350-400. Twenty-seven individual weapons and sev-

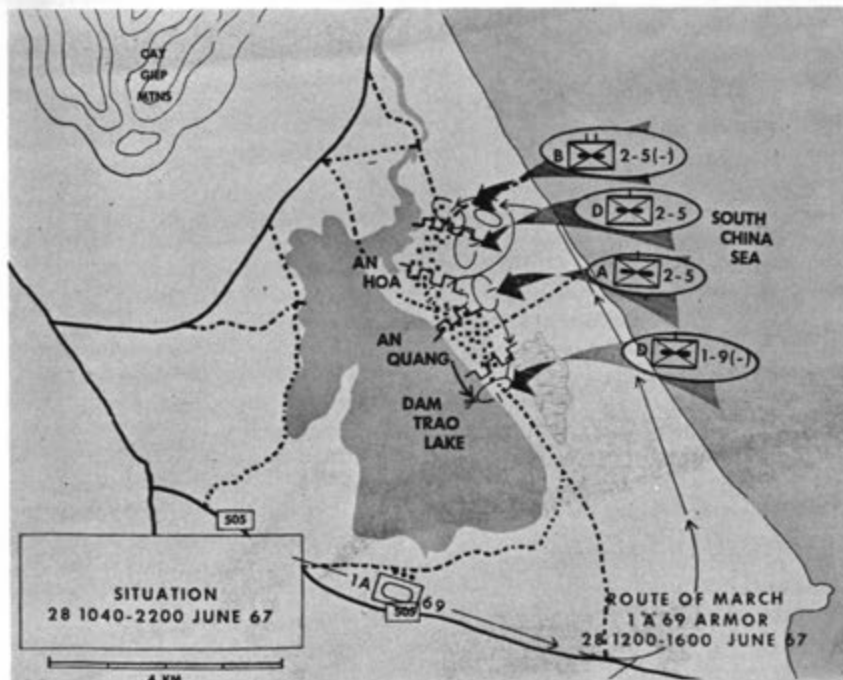


eral crew served weapons were captured. Other weapons were found with additional enemy dead in collapsed bunkers throughout the summer of 1967.

U. S. losses were eight killed and 36 wounded. Two tanks were knocked out by mines near the south end of Dam Trao Lake enroute to the contact area. Although several 1st of the 9th aircraft sustained numerous hits from enemy ground fire, none were shot down or severely damaged. Three thousand five-hundred rounds of mixed artillery and 26 airstrikes were utilized, the majority of these were called for and con-

trolled by scout and aeroweapons teams of the 1st of the 9th in close coordination with the CO, 2/5 Cav. In addition, continuous scout and gunship support was provided throughout the contact by all three of the squadron's air cav troops.

The action just described is typical of many of the 1st Cavalry Division's major engagements in 1967. I know of no other action, however, in my year with the 1st Cavalry Division, which more vividly portrays the flexibility, versatility, reaction speed, and tactical techniques used by air cavalry in its role of finding and fixing a major enemy force.





CAVALRY AIR AND GROUND RECONNAISSANCE

by Major CECIL L. SHRADER

former Weapons Platoon Leader, 1st Squadron, 9th Cavalry, 1st Cavalry Division

You have just seen how the air cavalry squadron performs its role of finding and fixing an enemy force and how it goes about getting a maneuver battalion into a major contact. I will discuss a typical air cavalry platoon-troop air-ground reconnaissance operation in South Vietnam and highlight some major principles and techniques that were followed.

On 16 November 1966, based upon intelligence from higher headquarters, Troop C was directed by the Commanding Officer, 1st Squadron, 9th Cavalry to make aerial and ground reconnaissance in the southern portion of the Kim Son river complex, commonly referred to as the Crows Foot area. A preliminary aerial recon indicated that there had been recent heavy movement over the trails on the high ground west of the stream. Accordingly, our "Blue" or aerorifle platoon was inserted and the troop commander began moving the platoon to the west-southwest to check the trails.

As this area had been the scene of recent NVA/VC movement, I began a systematic, low-level search along the streams, trails, and semi-destroyed villages to the north. As I proceeded north, it appeared that the trail to the north had been used recently. In the northern-most destroyed village there were definite signs of current activity as a bunker was being built, and the fortifications normally associated with villages in this area were being renovated. This triggered a closer look at the remainder of the village.

As a result of this investigation, several drying trays of rice were discovered, and just to the east of the village, along an ill-defined path, were several khaki uniforms hung out to dry. At about this time, a movement of what appeared to be a man in khaki in the doorway of the only standing hut caught my eye. A closer inspection of the hut revealed

an SKS carbine leaning against the side of the hut. Based on this, I reconned by fire in the vicinity of the hut with an M5 40mm grenade launcher. This flushed two NVA soldiers out of the hut and into the nearby bunkers. I immediately reported my sightings to the troop commander and kept the area under surveillance.

Since the area of the south did not appear profitable and there were



obviously NVA in this village, the troop commander immediately turned the Blue platoon back toward the landing zone (LZ). I then sent a spot report to troop operations and alerted the lift section for a reemployment of the Blue platoon.

We then air assaulted the Blue platoon into an LZ north of the village only minutes after my initial sightings were made. The terrain was such that a fairly well protected landing could be made there, and any attempts at exfiltration by the NVA could be interdicted from the air.

Once in the LZ, the Blue platoon began a sweep south through the

village checking each bunker as they went. Resistance encountered was in the form of hand grenades thrown out of bunkers by the NVA. Our prime mission was gathering intelligence and as a consequence, we always attempted to take prisoners. The Vietnamese interpreter assigned to the troop tried to induce the NVA to surrender, but to no avail. During the sweep through the village, the Blue platoon had no casualties while killing 10 NVA, capturing four packs, one carbine, 12 hand grenades, and documents in the packs identifying the NVA as members of a transportation platoon supporting the 18th NVA regiment. Also in the huts hidden under the jungle canopy, and discovered from the air, was approximately a ton of rice gathered by the NVA. This highly successful, if small, action is typical of platoon and troop level operations conducted on a daily basis by the air cavalry troops of the 1st Squadron, 9th Cavalry.

Based on my experience, I consider the following factors as those most essential to the successful accomplishment of air cavalry reconnaissance operations.

First, always check out trail networks and villages in the area of interest. Frequently, this led to the discovery of the NVA. Be aggressive when making aerial recon and never stop looking as the enemy can be, and usually is, everywhere. Aerial scouts must learn the intelligence indicators of the enemy in their area and how and where to look for them. In the foregoing example, a recently used trail, a bunker being built, rice out to dry, as well as the uniforms, clearly indicated NVA/VC in the area.

In order to be fully effective in finding the enemy, air cav scouts must fly low and slow—low enough and slow enough to see footprints on a muddy trail, count them, see which way they are going, and even if sandaled or barefoot. Without fly-



ing low and practically hovering, the carbine might not have been discovered and the subsequent recon by fire, which flushed the NVA out of hiding, might not have been made.

Although much information can be gained from the air by following the principles just described, often it is essential to employ the aerorifle platoon of the troop in the ground reconnaissance role to confirm the in-

formation. Most of our contacts were started in this manner. In the example given by Colonel Nevins, the employment of the aerorifle force resulted in a major contact where large reaction forces were required. In the action I described, the aerorifle platoon, as was often the case, handled the situation without help from outside the troop. This action also points out the need for the aero-

rifle platoon to fight to secure accurate current intelligence.

All commanders must remain flexible and adjust rapidly to changing situations. Any delay can lead to a lost opportunity.

Following the precepts which I have just summarized helped my troop consistently to find the enemy and to inflict heavy casualties on him with minor losses to ourselves.

TANKS IN THE ATTACK OF A FORTIFIED VILLAGE

by Major DONALD W. WILLIAMS

former Commanding Officer, Company A, 1st Battalion, 69th Armor

During the months of February and March of 1967, the 1st Air Cavalry Division fought several battles against VC and NVA forces in well fortified and heavily entrenched village complexes located in northern Binh Dinh Province. Because this type of confrontation required a heavy commitment of forces and a resultant high casualty rate to dislodge and defeat the enemy, the 1st Cavalry Division requested Armor support from I Field Force headquarters. On 31 March, Company A, 1st Battalion, 69th Armor, landed over the beach to assume its mission with the 1st Cavalry Division. During the months of May, June, and July, Company A was involved in several major battles with VC and NVA units in fortified village complexes. One of these battles illustrates quite well how tank units are employed in Vietnam.

On the morning of 1 July 1967, my 3d Platoon left landing zone GERONIMO with two bulldozers and a platoon from Company A, 1st Battalion, 8th Cavalry to destroy enemy bunkers. After crossing the stream southwest of the village of Tuy An, men in khaki uniforms were sighted in the southern part of the village. Four tanks and two squads of infantry went to investigate. As they approached the village, heavy automatic weapons fire was received from an enemy force defending bunkers in the hedgerows at the edge of the hamlet. The four tanks and the infantry immediately opened fire with all available weapons. The fifth tank, which remained with a squad of in-

fantry to secure the two bulldozers, moved to assist. The initial fighting, which lasted about 20 minutes, was brief and vicious with the tanks using all their available weapons including hand grenades to place the heaviest fire possible on the enemy positions. The enemy forces along the hedgerow bunkers finally broke contact and retreated into the village.



During the next two hours the remainder of A, B and D Companies, 1/8 Cavalry were airlifted into the battle area. A heavy section of tanks and a medical APC were also sent from LZ ENGLISH to reinforce my 3d Platoon. Also during this period, resupply of ammunition and consolidation of positions was accomplished and the village was saturated with air strikes, helicopter fires and artillery.

Then an attack from north to south was launched. It was soon found that tank maneuverability was severely hindered by very rough terrain and large rock formations in the northwestern portion of the village. After the infantry eliminated the enemy resistance in this area with the tanks supporting by fire, the tank-infantry team continued to assault the northern portion of the hamlet. At 1530 the attack was temporarily halted to permit consolidation, resupply of ammunition, and to employ CS gas on the southern portion of the village.

Let me interject here that, because of the large volume of ammunition used, resupply of main gun ammunition is critical in an operation such as this. For example, during the initial contact approximately 75 percent of the basic load was used and then during the assault in the northern portion of the hamlet the entire basic load was fired. To ensure continuous resupply, main gun ammunition was always preslung and available for immediate air lift to an ammunition supply point established in the battle area.

The attack was resumed at approximately 1630 with the tanks leading the assault. By this time the heavy section of tanks from LZ ENGLISH had arrived and joined in the assault. The tanks, using techniques learned in previous battles, swept through the village to kill or drive the enemy from his fortified positions. Cannister ammunition was used first to blow away the hedgerows and then the tops of palm trees



Thoughts on

**FUTURE
TANK DESIGNS**

by Richard M. Ogorkiewicz

The past few years have seen a remarkable increase in the number of countries producing battle tanks. Not so long ago there were only three: the United States, Britain and the Soviet Union. Now, however, there are thirteen and between them they have produced a new generation of battle tanks.

All this activity leaves little doubt about the importance which armies throughout the world continue to attach to tanks. It also sets the scene for some time to come since the tanks which are now being produced will remain in production for another two or three years and in service for many more. But what will follow them?

There will certainly be a need for another generation of battle tanks, if tanks are taken for what they basically are, namely a means of making heavy weapons more mobile or, in other words, mobile ground weapon platforms. Indeed, as such, tanks are going to be needed as long as there are ground forces. What is far less certain is the form which they will take in the future.

Some indication of the shape of things to come is given by the *MBT70*, the main battle tank being developed by the United States and Germany for service in the seventies. However, this vehicle only represents a particular solution and is not necessarily indicative of the form which the majority of future tanks might or should take. Therefore, it is more sound not to rely entirely on a single solution but to consider the general trends in tank design.

Tanks are carriers of weapons intended to destroy battlefield targets of which the most difficult are hostile tanks. Hence, the primary criterion of their effectiveness is their ability to kill hostile tanks. This, in turn, involves the ability of their weapons to perforate armor. Therefore, any attempt at identifying trends in tank design might well start with the growth of the armor piercing capability.

How the ability of tanks to perforate armor has grown over the years is shown in Figure 1, where the penetration of tank weapons has been plotted against their year of introduction. The penetration shown is at normal impact and at 500 meters, which corresponds approximately to the average range of tank engagements during World War II. Since then the expected range of engagements has increased but the performance of APDS projectiles, which are typical of current high velocity ammunition, falls off relatively little with range while that of HEAT projectiles or missiles is independent of range. Therefore, penetration at 500 meters provides a reasonable basis for comparing the armor piercing performance of different tank weapons over the past fifty years.

When the results shown in Figure 1 are examined, it is evident that the armor piercing capability of tanks has risen steeply during the past thirty years. This is due to the combined effect of two developments. One is the fitting of tanks with progressively larger weapons which has increased penetration in proportion to the caliber

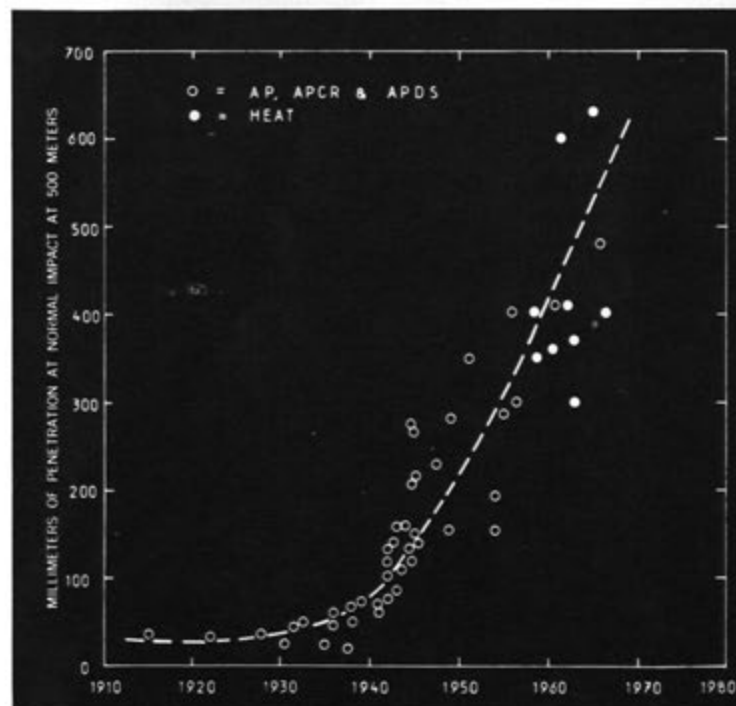


Figure 1—Growth of the armor-piercing capability of tank guns over the years as it is represented by penetration at normal impact at 500 meters. Vertical scale represents millimeters of penetration.

of the weapon. The other development is improved effectiveness of armor piercing weapons in relation to their size, which has increased the tanks' ability to penetrate armor still further. In consequence, the armor piercing capability of tanks is now very considerable and there is no evidence that a limit has been reached.

APDS versus HEAT

Recent advances in armor penetration have been achieved almost entirely with APDS and HEAT ammunition. Of the two, HEAT ammunition offers superior penetration. But, its relative performance needs to be qualified because shaped charges can penetrate armor without doing much harm. This became evident during World War II, when shaped charge weapons were first introduced, and has been brought out again in Vietnam.

Thus, shaped charge projectiles or missiles must be capable of perforating a significantly greater thickness of armor than that which they are expected to defeat if they are to cause lethal damage behind the armor. In other words, the thickness of armor which HEAT projectiles or missiles perforate **with lethal effect** is less than the thickness which they can just penetrate.

Moreover, the effectiveness of HEAT projectiles and missiles can be reduced by grids or similar devices installed in front of armor. Such devices, which set off shaped charges away from armor, have to be located well in front of the armor. However, when this can be done these protective arrangements can reduce penetration significantly. Alternatively, the penetration of shaped charge warheads can be reduced considerably in relation to the weight of the additional protection by resorting to slabs of low density polymeric materials.

GUNS versus GUIDED MISSILES

Comparisons between APDS ammunition on the one hand and HEAT projectiles and missiles on the other bring out other facets of the weapon systems of which they are a part. A leading comparative factor is complexity which is generally greater with the latter ammunition types. This is particularly true of guided missiles which are the most attractive means of delivering HEAT warheads but their reliability is significantly lower than that of the simpler and more robust gun systems.

Notwithstanding, the probability of scoring a hit with a gun falls off rapidly with range while that of missiles does not. Consequently, the overall effectiveness of a HEAT guided missile system is greater

at long ranges than that of a gun firing APDS shot while the converse is true at short ranges. The crossover point is not easy to define but most recent estimates put it at between 2000 and 3000 meters.

What really matters, however, is not the exact range at which guided missiles become more effective than guns, or vice versa, but what this range is in relation to the range at which tanks most frequently sight each other. Clearly, if the range at which missiles become more effective than guns is well above the range at which tanks sight each other then guns are superior overall. This appears to be the case.

At any rate, this conclusion has been reached in Germany where a 120mm gun firing APDS is now favored for the *MBT70*. A similar conclusion was reached earlier in Britain, as shown by the 120mm gun of the *Chieftain* battle tank. But the German conclusion is more telling as it is the more recent and has been reached in face of competition from the 152mm gun/launcher firing *Shillelagh* missiles which is favored by the United States for the *MBT70*.

French views, on the other hand, coincide with the American preference for guided missiles. Having confined itself to HEAT projectiles for the 105mm gun of the current *AMX30* battle tank, the French Army is now developing missiles as the armament of its future battle tanks. These missiles have been given the generic name of A.C.R.A. (*Anti-Char Rapide Autoguide*) which gives an indication of their principal characteristics, namely supersonic speed and automatic guidance.

Higher speeds and more sophisticated guidance systems will undoubtedly characterize other future missiles. Also, these missiles are likely to have more effective shaped charge warheads. Improvements in their manufacture can increase armor penetration at optimum stand off distance from about four to more than five times the charge cone diameter.

Improvements in the performance of guns firing APDS shot might be expected to come, in the first instance, from further increases in muzzle velocity. At present the muzzle velocity of APDS shot ranges from about 4400 to 5000 feet per second (fps) but higher velocities are quite feasible.

In fact, as many as thirty years ago German researchers working with Mauser rifles showed that muzzle velocities of up to 9150fps were attainable with powder propelled projectiles. A few years

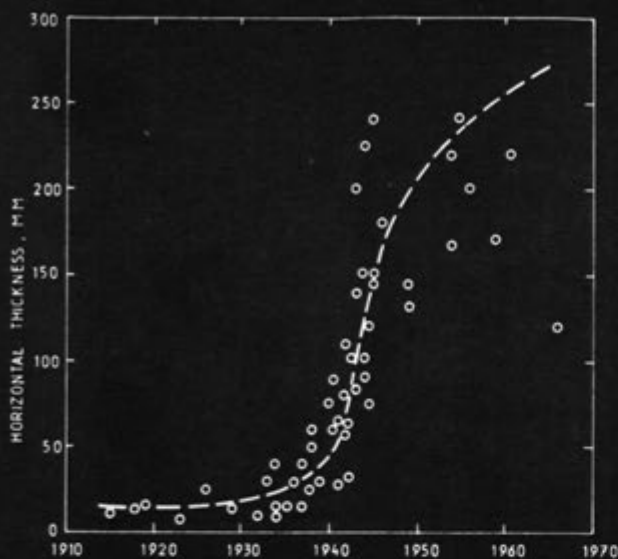


Figure 2—Trend in the armor protection of tanks as represented by the horizontal thickness of the frontal hull plates. The vertical scale represents horizontal thickness in millimeters.

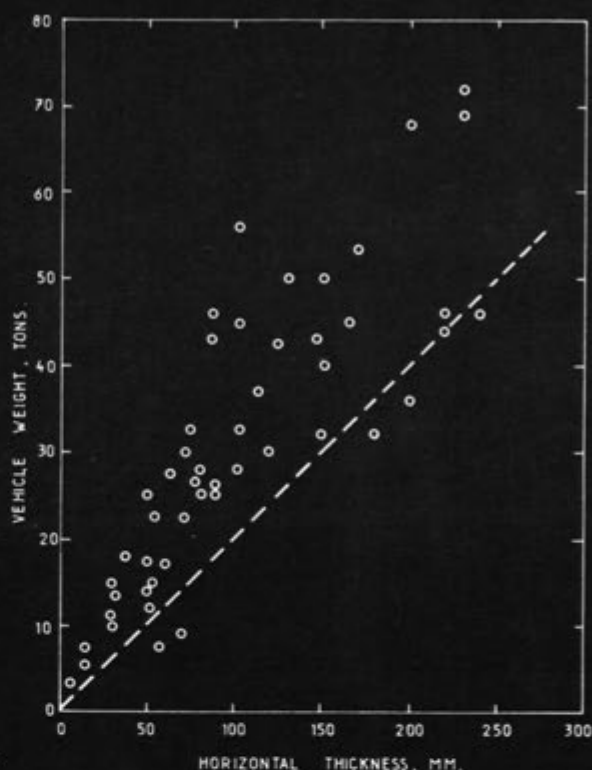


Figure 3—Graph relating vehicle weight increase (vertical scale in tons) to the horizontal thickness of frontal hull armor.

ago this velocity was actually attained at the Canadian Armament Research and Development Establishment with a modified 76mm gun. Admittedly, velocities in excess of 9000fps have only been achieved with very light projectiles. But a practicable ratio of projectile to powder charge weight could be obtained at muzzle velocities of 6000 to 7000fps.

Unfortunately, when projectiles strike armor at very high velocities the mechanics of penetration change from those which apply to present day APDS shot and less effective use is made of the kinetic energy imparted to the projectile by the gun. Therefore, increases in muzzle velocity beyond the current maximum of about 5000fps are far less attractive as a method of achieving still greater penetration with any given size of gun than might appear at first sight.

Higher velocities might still be desirable as a means of making projectile trajectories even flatter and thereby increasing hit probability. However, an alternative approach to greater hit probabilities is generally preferred. This is to use more sophisticated fire control systems featuring laser range-finders and ballistic computers. However, more sophisticated fire control devices rob APDS firing guns of some of their advantages of simplicity and reliability. Moreover, more sophisticated fire con-

trol systems will benefit not only APDS shot but also other types of projectiles. They might do so to such an extent in fact, that medium velocity guns firing HEAT projectiles might become a more attractive alternative than they are at present.

ARMOR PROTECTION

The rise in the armor piercing capability of tanks illustrated in Figure 1 is interrelated, of course, with increases in the armor protection of tanks. The increases in armor protection over the years can be characterized by plotting the horizontal thickness of the upper frontal hull plates of different tanks against their year of introduction. The upper frontal hull plates have been chosen because they are critical and, at the same time, they are more constant in thickness than the front of the turret, so that they are easier to define.

The results of such a plot are shown in Figure 2. The data provides an interesting comparison with the penetration data shown in Figure 1. Evidently, the thickness of armor rose rapidly during World War II just as the penetration capability of tank guns did. But, whereas penetration has continued to rise steeply, the thickness of armor has not increased substantially from that introduced in 1944 and 1945. As a result, the thickness of tank armor

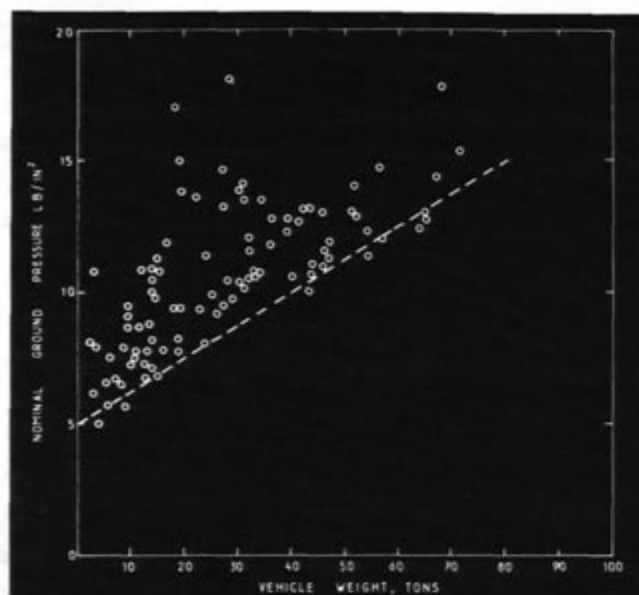


Figure 4—Plot of nominal ground pressure in pounds per square inch (vertical scale) against vehicle weight. The broken line corresponds to the best designs.

is becoming less than that which tank weapons can perforate.

Any attempt to increase further the thickness of armor runs up against the problem of vehicle weight. The actual relationship between thickness and weight is illustrated in Figure 3. This shows a plot, covering the designs of the past twenty-five years, of the thickness of the upper frontal hull plates versus vehicle weight. The best that can be expected is indicated by the broken line which corresponds to the equation

$$T = 5 \times W$$

where T = horizontal thickness of upper frontal hull armor in millimeters and
 W = weight of tank in long tons.

Thus, a tank with a horizontal thickness of hull armor of 100mm might be expected to weigh at least 20 tons and one with 200mm 40 tons and so on.

WEIGHT AND GROUND PRESSURE

Having established the relationship between armor thickness and vehicle weight, the next problem to consider is the effect of vehicle weight on the pressure exerted by tanks on the ground. This ground pressure has a most important influence on tank mobility.

The essence of the problem is that ground pressure increases with vehicle weight. In other words, track size cannot be increased in direct proportion

to the weight of tanks. Thus heavy tanks inevitably have a higher ground pressure than light tanks.

This fact is still not generally recognized, even by some authors of articles in *ARMOR* who ought to know better. For instance, the author of an article on "How Heavy the Thunderbolt" in the May-June 1966 issue of *ARMOR* tried to show that a heavy battle tank need not have a higher ground pressure than a light reconnaissance tank. What he ignored was the fact that his argument was based on a fallacious comparison between well-designed heavy tanks and lighter tanks poorly designed from the track point of view. The relative position would have been quite different had a well-designed light tank been considered.

The differences which exist between good and poor designs is indicated by the vertical spread of points in Figure 4, which shows a plot of ground pressure against vehicle weight covering tanks designed during the past thirty-odd years. The best designs are clearly those which give the lowest ground pressure for any given vehicle weight. Points which represent such designs rise with increasing weight and the dotted line drawn through them corresponds to the equation:

$$P = 5 + \frac{W}{8}$$

where P = nominal ground pressure in pounds per square inch (psi)

W = vehicle weight in long tons

Thus, according to the above equation, the lowest ground pressure that might be achieved with a tank weighing 48 long tons (54 short tons) is 11 psi. But a 16 ton tank can have a ground pressure of as little as 7psi.

As a result, because ground pressure increases with vehicle weight, the heavier the tank the more likely it is to run into difficulties off the road. For instance, a relatively light, well-designed battle tank with a ground pressure of 10psi, or less, will have an adequate performance in most types of terrain. But a heavy vehicle with 13psi, which is the ground pressure of some of today's heavy battle tanks, can get bogged down even in agricultural soils.

Because of the need to keep the ground pressure down, in order to maintain an adequate level of mobility, the weight of tanks must clearly be down also. In turn, weight limitations mean that tanks can no longer be provided with enough armor to make even their fronts immune to all hostile weapons.

This does not mean that tanks are no longer viable, as some ill-informed journalists seem to think. But it does mean that the employment of tanks must be based, more than ever, on fire and movement rather than the passive attributes of armor protection.

The constraints imposed by weight also mean that tank designers must give up trying to achieve the impossible, namely trying to make tanks invulnerable. Instead they should concern themselves more with deciding just how many hostile weapons will have to be allowed to perforate tank armor. If too many, the task of an enemy will obviously be made too easy and tanks will have too little freedom of movement on the battlefield. If too few, the tanks will be heavy and their capability of being where and when they are needed will suffer.

SURVIVAL AND SILHOUETTE

Whatever the weight of tanks and the thickness of armor, their probability of survival on the battlefield can be increased significantly by reducing their silhouettes to a minimum, either permanently or temporarily.

The best example of the first approach is provided by the Swedish *S tank*, which has no turret. The consequent reduction in height offers advantages which are still not fully appreciated even, once again, by the authors of articles in *ARMOR*. For instance, the author of the article "M60A1 Name Enough" in July-August 1965 issue of *ARMOR* claimed that the height of tanks was of little consequence, mainly because tanks in firing positions try to expose only their turrets. This ignored, however, not only the fact that defilade positions are not always conveniently available but, what is more, that tanks frequently have to leave cover to advance against the enemy. When they do the probability of a low, turretless tank, such as the *S tank*, being hit by, for example, a typical hostile tank gun at 1000 meters is 30 percent less than that of the best of the conventional turreted tanks.

An example of the second approach is provided by the *MBT70*, which has an adjustable hydro-pneumatic suspension with large travel. In consequence, it is able to take up firing positions behind cover with little more than its periscopes showing over it and must expose its turret only when it has to rise to fire its main armament. The ability to do this will be particularly valuable to tanks on the defensive. This will increase still further their chances of success against attacking hostile tanks.

In view of the current interest in adjustable suspensions, it might be worth adding that the idea of raising and lowering the whole tank by means of its suspension is at least 24 years old. This capability was planned for the *E10* light tank which was being designed in Germany toward the end of World War II.

The probability of survival on the battlefield can also be increased by tanks being more agile, as a result of being fitted with engines giving higher power-to-weight ratios.

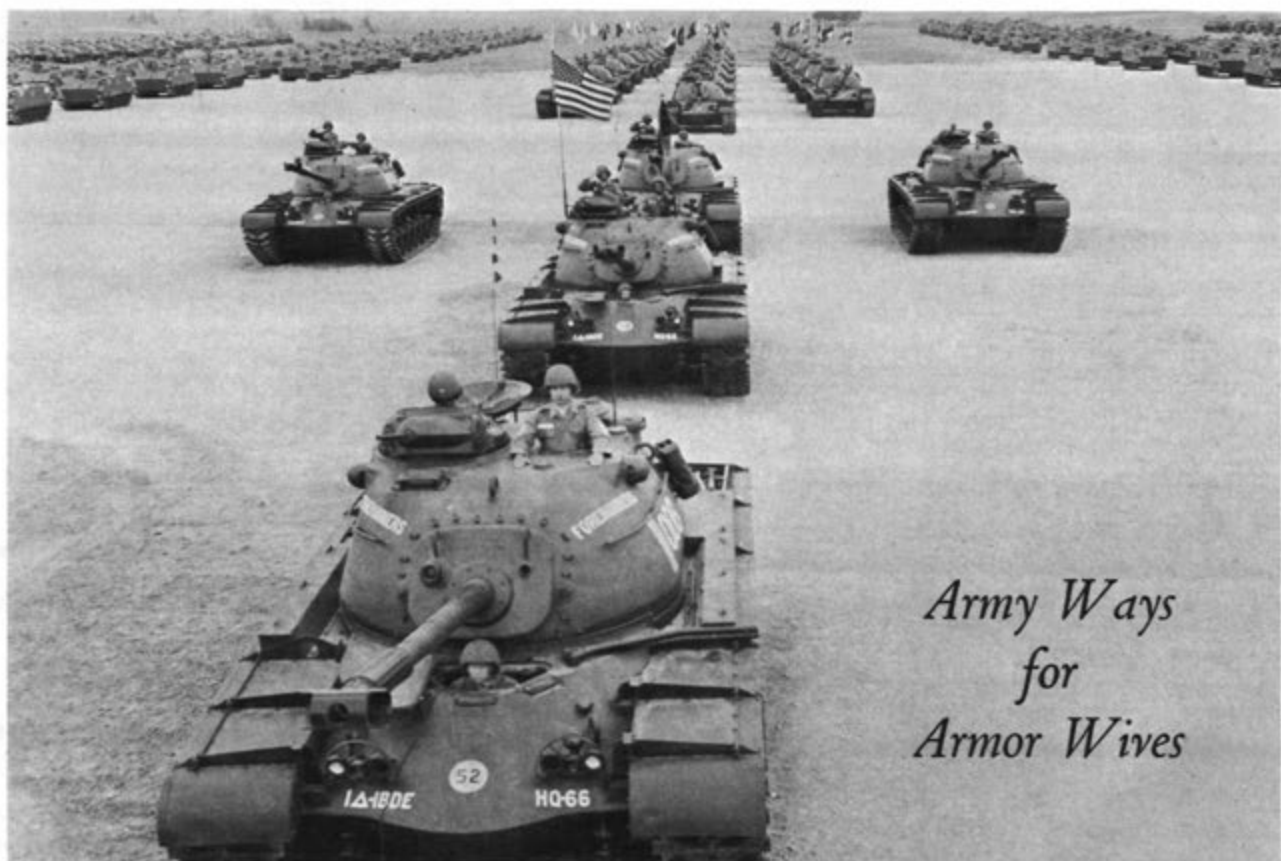
The German *Leopard* and the French *AMX30*, which are in advance of the other battle tanks in this respect, already have 20bhp per long ton. The *MBT70* has even more: in fact, as much as 30bhp per long ton. This very high power-to-weight ratio has been made possible by the development of the variable compression engine which has a high output in relation to its size. But, unfortunately, this brings in complexity where it is least desirable in an engine, namely in the pistons.

One advantage which is not likely to accrue from higher power-to-weight ratios is a significantly higher **sustained** speed of tanks off the road. This, for all the claims being made for hydro-pneumatic suspensions, will remain severely restricted by the ride characteristics of tanks and the vibration tolerance of their crews.

Therefore, tanks are not simply going to become faster moving targets and thereby more difficult to hit. This is sometimes disingenuously suggested in attempts to show that greater agility is not going to improve their chances of survival. Quite clearly any possible increase in speed will not alter greatly the probability of tanks being hit once a hostile weapon has been aimed at them.

But higher power-to-weight ratios will improve their acceleration, which will enable them to dash more quickly from cover to cover. This will also increase their *average* cross-country speed. In general, therefore, tanks will be able to expose themselves for shorter periods of time during which they can be observed, aimed and fired at.

The advantages which accrue from greater agility are not, however, automatic but are dependent to a very large extent on the tactics pursued by tank units. In particular, slow-motion head-on assault tactics of the kind seen all too often in the past can nullify most of the advantages of agility which tanks possess. The future effectiveness of tanks depends on the way they are employed as much as on their design.



Army Ways for Armor Wives

To The Colors

by Marion F. Leach

For the Armor wife, the expression "to the colors" should mean more than just the bugle call played as the Stars and Stripes are lowered at retreat each day. To the colors should be the background music for the patriotic beat of her heart at a review, parade or any time she sees troops and colors going by! It should nurture that special feeling of pride she has for country, unit, and trooper husband on review. It should be the cue for her response to our national flag.

Tradition dictates that respect and courtesy be paid "to the colors" by all our country's citizens. The Armor wife is more than just an ordinary citizen for she is partner to one of the world's best fighting men, a soldier in the United States Army, a man of Armor. So she of all people should display her patriotism. Although patriotism may be a bit archaic in some circles it never will be to the Army.

Attendance at parades is one way an Armor wife shows her patriotic feelings. She attends often and is always neatly groomed and well dressed. (She wore pink curlers to get pretty and slacks to drive the car pool but she dressed up to go to the parade.) She most likely will wear a hat, for wearing hats to parades is an old Army custom she

follows. She spruced up the youngsters too, for she wants their parading father to be as proud of them as they are of him. And she'll see to it that they are well behaved. Running and climbing are as out of place for them as smoking, loud conversation and inattentiveness are for her.

Flag knowledge is another patriotic manifestation of the Armor wife. She, of course, knows her country's flag and doesn't have to be told to stand as it passes her in review. She rises as it approaches and stands until it has passed her. While the military in uniform salute and the civilian men remove their hats and place them over their breasts, the Army wife stands quietly at an easy attention and may place her gloved right hand over her heart. She is honoring her country, her flag and the men who march behind it. Some may prefer to stand with hands by the side and this is also quite correct.

Army wives are proud of unit flags too and it doesn't take long for Armor wives to experience the thrill of to the colors, Armor colors, that is! It does not matter whether they fly for an armored division, an armored cavalry regiment, a brigade or one of the many armor battalions and squadrons scattered around the world. If Armor wives are there too, they delight in the cavalry yellow standard with its embroidered emblem and battle streamers. Unit colors were originally used as a means of battlefield identification and many an old print shows the battle colors tattered and torn but held proudly as a charge was being made. This military custom persisted until the close of the Civil War when it was abandoned. Today's colors are used only for ceremonies and parades but they capture the spirit of identification for the Army branches and the units therein.



And thrill of thrills for the Army wife whose husband is in Armor—a mounted review! They do not occur often but the panorama, excitement and pageantry live on in the heart and memory of those fortunate enough to have witnessed one. Troops on parade are exciting but tanks are spectacular. The colors are there but mounted and more beautiful than ever. Even the guidons take on an extra special flutter. One Armor wife was so moved that she (and those around her) stood at attention when the guidons went by too! A true Armor wife indeed.

"Hats off, the flag is passing by," runs a line from an old poem but for an Armor wife "Hearts up, the flag is passing by," is more appropriate, for truly her heart does beat a skip faster for freedom, country and the Army, with each sight and every sound of "to the colors."

MARION F. LEACH, the author, is shown receiving an ARMOR Certificate of Appreciation for her article "Uncle Sam Wants You" (ARMOR March-April 1968) from Major General Joseph A. McChristian, acting III Corps commander. Mrs. Leach is the wife of Colonel James H. Leach, Armor, who is presently stationed in Vietnam. The book *What Every Army Wife Should Know*, of which she is the co-author, is an ARMOR best seller.



THE SHERIDAN

by CAPTAIN ROBERT A. SERIO, JR.



The technical history of Armor is both colorful and dynamic in that it has always seethed with argument in the attempt to achieve the tank with the optimum of fire power, mobility and armor protection. Our imperfect technology and the variety of required missions forced this nation and many others to build two and even three types of tanks. The Second World War and Korea saw the development of light tanks for use in the Cavalry role and heavy and medium tanks to close with and destroy the enemy.

But in the mid-fifties a significant change in the thinking of those who produce tanks occurred. The pendulum, which had once swung through all the points of the light, medium, and heavy, stopped and centered itself. The heavy tank was proving unwieldy and a maintenance headache. Its extra armor and slightly larger gun were insufficient compensation for the heavies' lack of mobility. Light tanks fared even worse. In his book entitled *Armor*, Rich-

ard M. Ogorkiewicz describes in succinct fashion the failing of the 22 ton M41 "... it was the least successful of the three tank types conceived after the war. It was too large and not mobile enough in relation to its size for a combat role. And, what was even more serious, it was too heavy to be an airborne tank."

In the early 1960's, however, the pendulum of change began to swing once again. New technological developments in the areas of weaponry, metallurgy and mobility made it possible to produce a light tank capable of correcting the serious problems noted by Ogorkiewicz in the M41.

The culmination of efforts in this direction has been the introduction of the M551 *General Sheridan*. The vehicle was built to meet the diverse criteria generated by the normal TOE requirements for a light tank and the special conditions imposed by the rapid response demanded by limited warfare and peace keeping operations such as the American

intervention in the Dominican Republic. Thus the *M551*, of necessity, had to be extremely mobile to cope with the wide varieties of terrain found in such places as Vietnam, Alaska, Europe, or the Sinai. For obvious reasons a swim capability was also desirable. But even more important was the ability to kill enemy armor. It needed a weapons system that was light enough to be carried by a small tank yet one which was at the same time capable of destroying heavy tanks at long range. Fifteen years ago requirements such as these were more likely to be met by a tank found on the pages of Buck Rogers' latest adventure. Today, however, these criteria have been met and, in some instances, exceeded in a vehicle weighing less than seventeen tons combat loaded.

Before launching into a discussion of the tactical potential of such a vehicle, it would, perhaps, be instructive to examine just how the *M551* stacks up against its design criteria by examining specific characteristics of the production *M551* currently being issued to troop units.

ELUSIVE AND ARMORED

The *Sheridan* weighs 16.8 tons combat loaded. Naturally a vehicle of this size cannot offer the ballistic protection of an *M60*; however, the sloping of armor and a judicious combination of steel and aluminum plate gives the *M551* substantially better ballistic qualities than either the *M113* or the *M114*. The vehicle was intended to protect the crew against

heavy machine guns and shrapnel, and this goal has been achieved. The low silhouette of the *General Sheridan*, 9 feet 8 inches (measured to the top of the .50 caliber machinegun) combined with a top speed of 43mph also adds to the overall effectiveness of the *M551*'s armor by rendering it a more elusive target.

A TRULY MOBILE VEHICLE

In the area of mobility the *Sheridan* is unsurpassed. Its engine is a V6 turbo charged diesel producing 300 horsepower. This engine gives the tank a higher horsepower to tonnage ratio than that of either the *M60* or *M48* series vehicles. When this powerplant is coupled with a four forward speed manually shiftable transmission and increased suspension travel, the dividends are numerous. Cross country speeds are substantially higher, and road marches can generally be conducted 5 to 10mph faster than with the *MBT*'s. The extra transmission gears allow drivers to downshift for hills and other obstacles thereby maintaining their speed. Acceleration and top speed are likewise favorably affected by the four speed transmission and increased power to weight ratio. The *Sheridan*'s fuel tanks hold 158 gallons giving the vehicle a maximum range of 373 miles.

Mobility is also a direct function of maintenance. To be truly mobile a vehicle must be reliable and relatively easy to keep in operating order. The 1st Battalion, 63d Armor at Fort Riley, Kansas has





the *M551* in its TOE, and it has been found more than adequate in the maintenance area. The lightness of suspension components combined with a proven engine (the *M577A1* uses this engine without turbo charger) help to make the vehicle much easier to repair than heavier tanks. Of course, minor maintenance problems have cropped up occasionally, particularly in the new all electric turret, but these difficulties are being taken care of in subsequent production vehicles by an active modification program.

In the field of mobility two other characteristics are noteworthy. First, the *Sheridan* is air transportable and air droppable by currently existing aircraft. This gives us a tank with a capability for rapid strategic response. As an added attraction, the *M551* swims with a water speed of 4mph. The *Sheridan*'s barrier system gives the vehicle a free board of about 3 feet thereby enabling it to traverse rougher water than either the *M113* or *M114*. The *Sheridan* can enter and exit the water at totally unprepared sites and over steep banks that would normally stop an *M113* or *M114*.

NEW TANK WEAPONS

Of course, it goes without saying that the *Sheridan*'s armament is its most interesting feature. The *M551*'s machineguns are conventionally mounted with a .50 caliber for the tank commander and a coaxial *M73* for the gunner. Four grenade launchers are affixed to each side of the turret for close-in protection and the establishment of smoke screens. These grenades are fired by the tank commander

in salvos or individually. In the area of main gun armament the *Sheridan* makes a total departure from all existing armor equipment save the prototype *MBT 70* and *M60-A1E2*. The *M551* is equipped with a short barreled gun-launcher capable of firing the *Shillelagh* missile or conventional ammunition.

The missile is unique in many ways. First, it is loaded like a normal round of tank gun ammunition. Second, the gunner engages a target just as he would when firing a conventional round. The gunner is simply required to keep the cross hair of his sight on the target, and the missile will fly to the point designated by the sight. On moving targets the same procedure is followed, and the missile corrects its flight path to align itself with the gunner's cross hair as he follows his target; no lead is necessary. This system has the notable advantage of eliminating the depth perception problems associated with the *SS11* generation of antitank weapons since the *Shillelagh* gunner does not fly the missile; he simply aims at his target, and the missile does the rest. Lastly, the effective range of the missile is considerably greater than the effective ranges of normal tank ammunition.

The *Sheridan*'s conventional ammunition is also new in that its cartridge case is fully combustible. Here the problem of brass in the fighting compartment is totally eliminated. This ammunition is still in the testing stages, and several types are planned to include HEAT multipurpose, HE and canister. As can be readily discerned, this array of ammunition will give the *M551* the unique capability to fight any ground targets.



WHAT WILL BE THE SHERIDAN ROLES?

Now that we have some idea of the exact nature of the *M551*, questions related to vehicular employment quite naturally begin to arise. We have been given a powerful and flexible tool, and it is our responsibility to decide how it can best be used and what commanders may expect of it in certain roles. Many of the ideas which follow did not originate with this author. In some ways they represent a synthesis of views culled from the officers and noncommissioned officers of the 63d Armor who have used the *Sheridan* for a year in tactical exercises.

To begin, let us consider the *M551* within the current TOE framework. Its primary use would be that of a light tank in the cavalry squadrons. For this role the *M551* is ideally suited. Its mobility is higher than either the *M113* or *M114* currently employed by cavalry units. Since the *M551* can swim, cavalry units faced with unfordable rivers in the reconnaissance or delay need not lose their armor support when faced by such a barrier. The compactness of the *Sheridan* is a double bonus for cavalry units. First, it is easier to conceal, and second, logistics becomes a simple matter as repair parts are lighter, and the vehicle uses less fuel than an *MBT*.

It goes without saying that the *Sheridan*'s main gun-launcher is a superb cavalry weapon. This gun-launcher gives a light cavalry unit the best antitank weapon in the world today—the *Shillelagh* missile. The use of this weapon, particularly in the delay, when under heavy enemy attack will enable cavalry units to engage the enemy at longer ranges, destroy

more enemy tanks and pull out more quickly than has been possible before. The *M551* also possesses a passive night sighting and observation system embodied in the *XM44* gunner's periscope and commander's starlight scope. These sights enable the vehicle crew to see at night without detection since these devices emit no light energy of their own but operate on the light intensification principle. Thus the *Sheridan* can scout and fight during the hours of darkness. All things considered, the *M551* is the vehicle the cavalry has always needed. It retains the total mobility that is an integral part of cavalry operations without sacrificing the power of the main gun that made the *M24* and *M41* inadequate for their assigned missions.

AN ASSET TO THE AIRBORNE

Again, within the current TOE framework, the *Sheridan* would be assigned to the cavalry squadrons of the airborne divisions. In this role the *M551* brings to the airborne division entirely new capabilities. Besides playing a major role in the antitank defense for these armor poor units, the *M551* can be used to muster a powerful counterattack during defensive operations. The ease of operations and light logistics load imposed by this vehicle also tend to suit it for use in airborne units. But the biggest boom offered by the *M551* is in the area of strategic response.

No doubt an airborne unit can effectively respond on short notice to a conflagration of the Vietnamese or Dominican Republic types. However, the use of a STRAC airborne unit to help control a conflict like the recent Arab-Israeli war leaves much to be

desired. Once on the ground an airborne division is essentially a light infantry unit with limited tactical mobility and little heavy fire power. The addition of substantial numbers of *M551*'s to such a division would materially increase the division's capabilities to deal in crises involving forces equipped with modern conventional weapons and engaged in the type combat we recently witnessed in the Sinai. In view of the numerous missions that can be assigned to airborne units under the aegis of response to limited war and peace keeping, the flexibility of the *Sheridan* weapons system will greatly enhance the ability of such units to accomplish these tasks.

NEW MISSIONS FOR THE SHERIDAN?

Beyond the realm of currently existing organizations there are numerous other possibilities for the *M551*. For the purposes of this article we might do well to consider two of them that seem particularly well suited to the current needs of the army. The first of these is the Tank Battalion, Light. This battalion would maintain the same basic configuration as the current medium tank battalions. The *M551* would be substituted for the medium tank and certain amphibious tracked supply vehicles would be added since the 2½ ton and 5 ton trucks are not fully compatible with the *Sheridan*. Such a battalion would bolster the combat power of any division. It could be used to augment the organic division cavalry when necessary. More important, this battalion would reduce the problem of water barriers and river lines. The commander would now be able to cross with effective and heavy armor fire power in his initial river assault wave. This capability will open up new tactical opportunities because the enemy who is now facing a force of *M551*'s must defend entire river lines, he can no longer afford to concentrate his defenses on fords and likely bridging sites. In addition, a battalion of *M551*'s can maintain the momentum of an attack which would normally be slowed or halted due to a water obstacle. Thus constant pressure is kept on the enemy, and he is prevented from regrouping and reorganizing his defenses on the opposite shore. In the exploitation the *Sheridan* battalion would be in a class by itself. Its heavy fire power, shorter logistics tail, speed, mobility and long range make it an ideal unit for use in soft enemy rear areas. For the same reasons the *Sheridan* battalion is equally adapted to encirclement missions during the pursuit. The tank battalion light might also be attached to an airborne division expecting to deploy

near enemy armor in order to give this unit the wherewithal to fight successfully in such an environment. The tank battalion light is possessed of great tactical and strategic mobility. With these characteristics it combines a maximum of fire power, and as such it would be an excellent unit for the wide variety of possible warfare types we currently face.

The second proposed organization is similar to the tank battalion light except that it would also contain at least one company of armored cars and would be used exclusively in counterinsurgency operations. Such an organization poses two main advantages. First, the *Sheridan* is better suited for use in Vietnam than the *M48A3* because of its superior mobility and flotation. The *M551* can traverse areas that are impassable even to the *M113*. With the advent of *Sheridans*, tank operations would not be as severely restricted by weather and unfavorable terrain. The second advantage of this organization is accrued through the use of armored cars. The strength of tank and cavalry units is frequently sapped by requirements for route security and convoy escort missions. The use of tracked vehicles in these operations is costly in many ways. It reduces tracked vehicles to a defensive role when they could be employed more effectively in offensive operations. It causes excessive wear and tear on tracks which were never designed to make long high speed road marches. Substitution of the armored car company of the battalion for such missions would alleviate these problems. Armored cars can be sufficiently armed to insure adequate security for road marches. Armored cars are faster than tracks while on the road, and they would be less subject to breakdown during these missions. Thus, a mixed battalion organization offers the commander greater flexibility in his response to the requirements of counterinsurgency operations such as those encountered in RVN today.

THE SHERIDAN COMPARES TO THE MBT

In some of the situations described in the preceding pages, the *M551* is asked to perform many of the functions normally associated with the *MBT*. This is particularly true when the *Sheridan* is used as the first wave of assault water crossings or to supplement airborne divisions. As a consequence the question of the serviceability of the light tank in this environment is immediately raised. No doubt many tankers will hark back to the early encounters of the *M24* and *T34* in the Korean War and offer this as incontrovertible proof that the light tank

cannot stand the strain of all out combat. However, it appears that a true picture of the Korean situation reveals that the *M24* did not survive because it mounted a low velocity 75 mm gun (1850 fps muzzle velocity), and this weapon could not pierce the heavy armor of the *T34*. The *Sheridan*, on the other hand, is not handicapped by a small weapon. In fact, it possesses the most powerful tank-gun in the world. It appears that perhaps more accurate predictions of the performance to be expected from the *Sheridan* under these conditions can be drawn from BG S.L.A. Marshall and an article he wrote in the November-December 1967 issue of *ARMOR*. General Marshall writes of the Israeli impressions of the Sinai war, and he relates Israeli opinion on tank types as follows, "On the whole, our tankers came through the campaign feeling better about the *Sherman* than the *Patton* or the *Centurion*. It is more mobile over a great variety of difficult terrain, some of which would normally be rated impassable. But one should not make too much of this. Only the name *Sherman* remains. Except for a few tanks we used in direct support of infantry, we replaced the 75 on the *Sherman* with the 105. The engine is new; also the suspension system is new. So in effect we are talking of a new tank."

A close perusal of this quote is truly illuminating. The *Sherman* discussed herein is a modified version of a 28 ton vehicle of WW II vintage. The turret armor of the *Sherman* is unsloped and about 1¼ inches thick. The front slope of the *Sherman* is riveted, not homogeneous, and about as thick as the

turret. In essence this vehicle offers ballistic protection similar to the *Sheridan* because it is not as sloped although somewhat thicker in certain areas. The factors which made the *Sherman* the outstanding vehicle of the Sinai were its powerful main gun and exceptional mobility when compared to the *Patton* or *Centurion*. The *Sheridan*, you will note, is considerably more mobile than this updated *Sherman*, and it also out guns any and all of the vehicles used by either side in the Sinai campaign. It is therefore reasonable to assume that the *Sheridan* will at least hold its own when required to perform as an *MBT*. In fact it may in some ways prove superior to many of its big brothers in free wheeling wide open blitzkrieg combat of the type recently engaged in by Israel and Egypt.

All things considered and regardless of one's disposition in the light versus heavy tank argument, the *Sheridan* must truly be considered a potent addition to the rank of armor. It is a gross oversimplification to dismiss the *M511* as just another light tank. It is light only so long as one is not forced to look down the muzzle of its main gun. In the final analysis the *Sheridan* has transcended the design limitations normally associated with light tanks. Due to the nature and size of the current AT and tank weapons, armor protection is to be achieved more through speed, low silhouette and good sound tactics than through thickness of plate. With these thoughts in mind, the *Sheridan* becomes a vehicle worthy of the esteem of any tanker, and one which should intrigue us with the tactical and strategic possibilities it offers.

CAPTAIN ROBERT F. SERIO, JR., Armor, was graduated from the United States Military Academy and the Army Ranger School in 1964. He then served in the 3d Battalion, 32d Armor, 3d Armored Division as a platoon leader, S3(Air) and battalion maintenance officer. Following the Tank Leaders Course at the Armor School he assumed command of Company A, 1st Battalion, 63d Armor at Fort Riley. For nearly a year he led this company during the time that the 1/63 Armor was the first troop unit to employ the *M551 Sheridan*. Early this year Captain Serio took command of Troop A, 1st Squadron, 4th Cavalry, 1st Infantry Division in Vietnam. On 17 April 1968, he was killed while leading his troop in battle.

"Soldier, rest! thy warfare o'er
Sleep the sleep that knows not breaking,
Dream of battled fields no more,
Days of danger, nights of waking."

—Scott





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NEW

AMPHIBIOUS ARMORED INFANTRY COMBAT VEHICLE

This extremely low-slung armored personnel carrier was first seen at the Moscow parade in November 1967. It would appear not to exceed 6-7 feet in height. The running gear has been improved over that of the BTR 50 APC and is obviously designed for higher speeds. The BTR 50 achieved 27mph on land and 6mph on water.

On the new vehicle a turret with an extremely low silhouette and mounting a new type gun with an estimated caliber of 70-80mm is positioned forward. A bracket above the gun carries a "Sagger" antitank guided missile. This is probably guided to its target from within the vehicle by using a telescopic on top of the turret. Infrared devices appear on some models.

The crew of the vehicle consists of the commander, driver, and, perhaps, a gunner. Eight infantrymen are carried in the rear compartment which has overhead protection. They can fire thru firing ports on all sides. Vision blocks are visible above the firing ports.

The engine is mounted across the vehicle forward of the turret next to the driver's compartment. Bar armor apparently reinforces the glacis plate across the top of the vehicle.

It is believed that propulsion in the water is by water jet, and, a departure for the Soviets, by track. Note the covered track and the fin assembly on the rear of the track shield.

Command vehicle configurations of this vehicle have been mentioned in various publications.

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SOVIET ARMOR

ASU 85 AIRBORNE ASSAULT GUN

The ASU 85 is a light (15.4 ton) assault gun designed primarily for airborne use. Its 18.7 foot length, 9.2 foot width and 6.9 height make it very compact. A 240hp six cylinder inclined water-cooled V6 diesel engine permits a 27mph speed with a 155 mile operating range. Glacis plate armor is 1.6 inches and that on the sides 0.6 inches.

Casemate mounted through the glacis plate is an improved 85mm gun tipped by a muzzle brake. Traverse is limited to 12 degrees. Elevation ranges from minus 4 to plus 15 degrees. There is a bore evacuator. Gunner's and commander's infrared searchlights can be seen.

The ASU 85 is based on the PT 76 amphibious tank chassis and has a nearly identical suspension system. However, unlike the PT 76, it is not amphibious.

The insignia shown on the right side plate is that of the Soviet airborne troops.



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BTR 60 PK WITH TURRET

The BTR 60 PK with turret is the newest in an interesting series of eight-wheeled Soviet armored personnel carriers. Each of these wheels is powered and independently sprung. However, only the forward two steer.

This latest version features overhead protection for the entire crew and a turret mounting an estimated 14.5mm machinegun. The model shown also has a 7.62mm machinegun. Earlier models without top armor, access doors and a turret caused some, or all, of the two or three man crew and 12 rifleman passengers to be exposed to small arms and artillery fire. There are firing ports and vision blocks.

This amphibious carrier weighs about 10 tons and is 23.6 feet long, 9.2 feet wide and 6.9 feet high. Powered by a water-cooled 180hp V8 gasoline engine, it is capable of speeds up to 50mph on land and 6-plus mph in the water. The cruising range is 310 miles.

Propulsion in the water is by single hydrojet at the rear of the engine compartment. Infrared night viewing devices are provided. The combat puncture-resistant run-flat tires have inflation-deflation devices which permit maintaining optimum pressures for varying terrain conditions.

The insignia shown is that of a "guards" (i.e. elite) unit.

AN IMPRESSION

To those who have the privilege, or the necessity, to read the leading military journals of the world, it has become increasingly evident over the past few months that the Soviet Union has been active in upgrading its armored equipment. Indications are that not only have advanced equipment items been developed but that these are being manufactured in sufficient quantities to make possible their issue to the troops of other Warsaw Pact nations in addition to those of the Soviet Union. The armor-oriented historian cannot help but be reminded of the impressive record of the Soviet Union in developing and manufacturing the outstanding for its time T34 tank prior to World War II. The new Soviet equipment, likewise, appears to reflect a proper concern for balanced firepower, armor protection, ease and cost of production, practicality and, above all, mobility. ARMOR acknowledges with thanks the considerable assistance of the editors of Aviation Week & Space Technology in making available the photographs presented here. THE EDITOR



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But—



*He's
Only
A . . .*

by Colonel Thomas W. Bowen

The young American major looked across at his Vietnamese driver who was sitting most erect in the driver's seat. He was happily smiling as he strove to contend with the frustrations of Saigon's traffic. "Nguyen Van Thai is really quite a boy," the major mused. "'Boy!' That was a real misnomer if there ever was one. Thai is more of a man than most people could ever hope to be." For behind the smiling face and button-bright eyes the major knew lay

four years with the Viet Minh when Ho Chi Minh, then a nationalist, was leading them against the French; before that was a boyhood spiced with running courier missions for the resistance against the Japanese; and then came the fight against the communists, an effort capped by two awards from the United States—one for saving an American officer's life at the risk of his own. Yes, if there was a man—Thai was one.

TITLE ILLUSTRATION BY MARY BURNEY

The incongruity of the whole situation caused the major to smile. He wondered how one of the anti-Vietnam war protestors would account for Thai—probably as a malcontent—a ne'er-do-well. But Thai was a case in point, the guy had a young wife with three starry-eyed kids and Thai had tried to explain in his best fractured English, "I work and fight for education for them". To the major, the message was really very clear. Thai's children were now his future and he held this goal as a most sacred trust. Thai had also tried to explain about the Vietnamese people and their apparent lack of regard for their young nation to the major. However, the task seemed to transcend his language capability. But, smiled the major, there was a man's man for all of that.

The traffic began to thin and even the jeep seemed to catch the freshening of the air and pick up speed of its own accord. Both the major and Thai also seemed to feel the quickening of the tempo as they headed for their place of work—the small district town southwest of Saigon. The air continued to freshen and the road continued to dwindle into smaller and rougher ones until finally it came close to being a trail. The traffic was now non-existent except for an occasional ox herded by a young boy slowly prodding the dumb animal home.

"No far now, sir," Thai smiled as he turned to the major.

"Not much further," replied the major, "We'll be home in time for supper."

Suddenly the jeep seemed to blast into the air, orange flames blossomed around both the major and Thai. The whole aura of their existence seemed to become ethereal. Everything seemed to float upwards, forced by an irresistible power. The major felt himself fly away from his jeep and as he floated through the air, his only thought was, "A mine—damn, what a way to go!" This thought was interrupted and completely dismissed by his contact with six inches of water supported by a silty bottom which became surprisingly firm as he dropped from twenty feet in the air.

Slowly the ground became solid and the sky slowed its rotation to a sort of jerky fuzziness. The major carefully pulled himself to an upright position. With cautious uncertain hands he checked his arms, legs, and chest. Assured that he was both alive and merely bruised, he looked about. The jeep lay fifteen feet away, the radio still crackling an unintelligible garble. "Where was Thai?" was the major's next thought.

He staggered uncertainly to his feet and lurched to the jeep's side—no Thai was visible. The major, holding onto the front bumper, moved to the far side of the jeep. As he rounded the corner, he saw Thai. The side of the jeep lay on his chest, his face was turned skyward and his eyes were closed. As quickly as his rather battered condition would allow, the American knelt beside his driver, "Thai, can I help?"

The quiet face moved and the eyes opened with a glazed expression, his lips moved and with an effort the words were whispered, "Did I do well? Are you proud of me?"

Tears came to the major's eyes, he could feel the stickiness of Thai's lifeblood moistening his hand which held Thai's head from the ground. "Yes, you did well, Thai, I'm proud of you." He had difficulty meeting those deep, dark eyes. "Your whole country is proud of you."

Thai took his last look at the blue of the Vietnamese sky and slowly, almost inaudibly murmured his last words, "Ah yes, my country!" Death came then. The major did not move, death was no stranger—but it had never been quite as personal. Twenty years of war and then death by an indiscriminantly laid mine when they were within minutes of their base and home. The incongruity seemed macabre.

The major turned as a convoy pulled to a halt by the jeep. A fresh-faced lieutenant hopped out and addressed the major, "Can we help you, Major?"

"Yes," the major slowly replied as he stood up. "I need a ride to town, my driver's dead under the jeep and I want to take him with me."

"We can sure take you in, sir," the lieutenant replied, "but I don't want to take a dead gook . . ."

The sentence was never finished. "Shut up, lieutenant, he was a friend—more than a friend—and he goes with me!" The terseness of the interruption removed the young officer's reluctance.

Shortly the convoy resumed its journey; the major sat with Thai's head in his lap. His thoughts went back to Thai's ambition. Yes, the education he had sought for his children was a trust and something difficult to achieve in this poor war-torn country. But education alone is not enough. The major thought of the lieutenant's remark, "But a dead gook. . . ." Education was the first step but it was not the only requirement for understanding—it takes more.

Recently promoted, Colonel Bowen previously served in Vietnam in 1964-65. This summer he completes another tour there with MACV and has volunteered to serve an additional year as a province advisor.

THE CHIEF OF CAVALRY'S CHAIR

Armor and Cavalry historical items are often thought to be found solely in such edifices as the museums at Forts Hood, Knox, Leavenworth and Riley or perhaps the Smithsonian. Not so, as evidenced by a handsomely designed and lastingly constructed chair in the Office of the Chief of Armor Branch at Washington, D.C. The chair is known as the Chief of Cavalry's Chair. It is recorded as U.S. Army Historical Property Number 67.64. And, it is still in daily use.

To appreciate its significance, it is necessary to understand its background.

From 1920 to 1942, the Chief of Cavalry functioned under the supervision of the Chief of Staff of the Army and had jurisdiction over all matters relating to the Cavalry including the allocation of personnel, funds and resources and the preparation of training literature and directives.

In his 1931 annual report to the Secretary of War the then Chief of Staff, General MacArthur, recognized certain problems in connection with the Army Staff. Among these was that its size prevented intimate and direct discussions of major problems by its various members and a general meeting of minds before final recommendations were submitted to the Chief of Staff.

In order to provide an opportunity for regular formal conferences of the various staff members, branch chiefs and bureau representatives, General MacArthur recommended that the Secretary of War establish a General Council. Such a Council was established in 1931 with the Deputy Chief of Staff as president. It existed in its original form until 1936, when the Council, as it operated during World War II, was established.

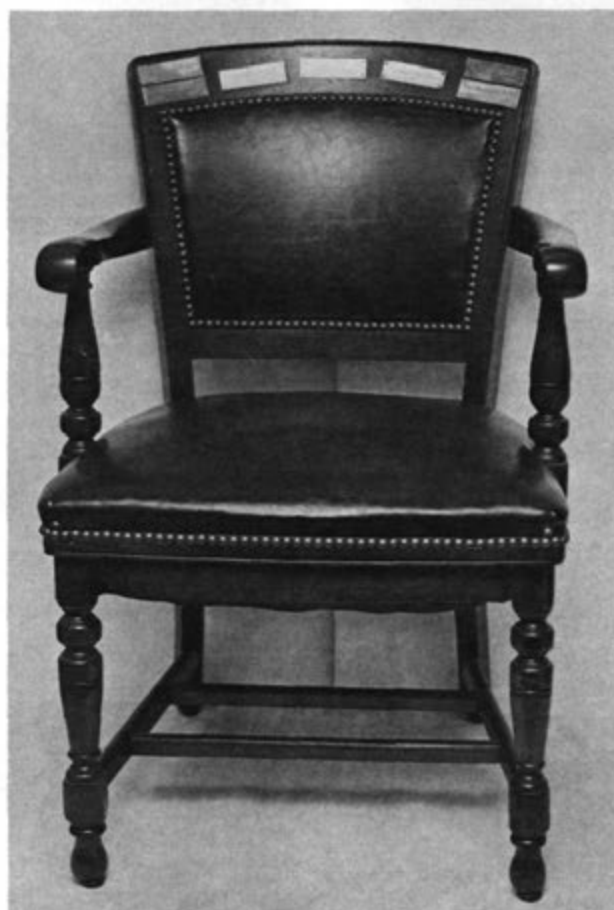
The Council met regularly to discuss and review all major War Department activities and plans. With the Deputy Chief of Staff as president and the Secretary of the General Staff as its secretary, the Council was composed during the war of the assistant chiefs of staff, the directors of the special staff divisions, the commanding generals of the three major commands (Army Ground Forces, Army Air Forces and Army Service Forces) and various officers. After its discussion of high level problems and projected policies, the Council presented recommendations to the Chief of Staff or to the War Council of the Secretary of War.

A matched set of 21 armchairs was used by the members of the General Council. Each chair has a dark green leather seat and back and measures 23 inches in width, 24 inches in depth and 34 inches in height, with the exception of the chair of the President of the Council which measures 26½ inches in width, 27½ inches in depth and 43 inches in height. Each chair has three or more brass plates identifying the position of its occupant and those who held the position over the years.

The following is recorded on the Chief of Cavalry's chair:

MG WILLIAM A. HOLBROOK	7/1/20	7/23/24
MG MALIN CRAIG	7/24/24	3/21/26
MG HERBERT B. CROSBY	3/22/26	3/20/30
MG GUY V. HENRY	1/7/31	3/21/34
MG LEON B. KROMER	3/22/34	3/25/38
MG JOHN K. HERR	3/26/38	3/9/42

Officers visiting Armor Branch are encouraged to see the chair—or better yet—try it for size.



The Development of Modern Japanese Armor

by General Tomio Hara



The first Japanese tank was designed and constructed in 1925 by the Imperial Army. From then until the termination of World War II, Japan maintained a place among the tank manufacturing nations by developing and producing a number of models and modifications of these models.

From 1945 to 1950 Japan had no military forces. In 1950, when the new Japanese Self-Defense Forces were organized hurriedly, the greater part of the required equipment was received from the United States. Included were American *M4A3* and *M24* tanks.

It soon became Japanese policy that the replacements for vehicles worn out in training should be produced indigenously. This policy recognized the importance of Japan having armor that was specifically suited to its topography and national conditions. In addition, this stemmed from the desirability of having equipment that could be supported logistically by in-country facilities.

Research and development on a new tank was initiated. Due to the many years of post-war engineering inactivity in the field of armor design, it was anticipated that difficulties would be encountered in meeting the requirements for armor in a new era.



LIEUTENANT GENERAL TOMIO HARA, Retired, was born on 12 June 1895. He received his commission from the Imperial Japanese Military Academy in 1915. In 1922 he graduated from the Mechanical Engineering Course at Tokyo Imperial University. He has been involved with armor in line units, research and development, design, and manufacturing for the greater part of his military career. During World War II he was a tank regiment commander. Later, as a lieutenant general, he held concurrent commands as Commandant of the Japanese Army Combat Vehicle Research Laboratory and Commanding General, Sagami Tank Arsenal. At the end of World War II he retired from active service. In 1961, as Chief of the Japanese Combat Vehicle Mission he visited a number of U.S. Army installations including The Armor Center, Aberdeen Proving Ground and the Tank-Automotive Command in Detroit. General Hara is currently the Executive Vice President of the Japan Ordnance Association and a technical adviser to the Japanese Defense Agency.

Fortunately, it was possible to draw on past experience and capabilities not all of which had been dispersed. Furthermore, a number of lessons concerning modern trends were learned through studies of the American equipment. These studies proved most valuable in designing the new Japanese armor.

DEVELOPMENT OF THE TYPE 61 BATTLE TANK

In developing the new main battle tank, tactical capabilities equal to the American *M48* tank were set as the objective. Since Japan is a mountainous country with few spacious plains where long distance exchanges of firepower would be expected, emphasis was placed on fast and elusive mobility. It was also necessary to keep the tank as light and small as possible because of the restrictions imposed by the limited local road net, the weakness of many bridges and the fact that most of Japan's railroads are narrow gauge.

Based on these factors it was decided that the tank's main armament should be a 90mm gun, and that it should have a fully equipped weight of 35 metric (38.6 short) tons, a maximum speed of 45kph (28mph) and exterior dimensions which would allow passage through the numerous railroad tunnels.

Arming the tank with a 90mm main gun, a .30 caliber coaxial machinegun and a .50 caliber machinegun on top of the turret followed the general trend of the early 50s. Emphasis was placed on high cross-country speed with vehicle stability. The weight limitation was imposed by the capabilities of the railroads. It was considered desirable to have a small, compact tank with a low silhouette which would reduce the potential target presented to the enemy.

The restriction in tank width limited the radius of the turret ring to the point that a design problem was posed. Also, the desired small size might sacrifice some crew comfort. However, in this respect, the smaller physique of the Japanese people offers advantages when compared to that of Caucasians. Experience had shown that the American tanks were actually too large for the Japanese crewmen who had some difficulty in reaching and operating the various controls. It had been found that these controls needed to be modified. Also it was felt that the interiors of the American tanks were too roomy and that consequently space was wasted. Therefore, in the proposed tank the interior dimensions were to be adjusted to eliminate superfluous space and to accommodate the stature of Japanese crews.

The Technical Research and Development Headquarters of the Japanese Defense Agency was responsible for project management. Detailed component design and prototype construction were by commercial firms. Mitsubishi Heavy Industries was the contractor for the hull and engine, Japan Steel Works for the 90mm gun and Nittiku Kinzoku Company for the machineguns.

Actual designing was begun in 1954. The first two prototype models (*A1* and *A2*) were finished in March 1957. Tests indicated that the expected results had been achieved and that the tanks functioned well. Following user tests, required modifications were incorporated into the drawings for the second series of prototype models (*A3* and *A4*). These models were completed in 1960 and tested to determine their reliability under a broad range of terrain and climatic conditions. The tests confirmed that the design was satisfactory. Therefore, the *A3* and *A4* models were standardized as the *Type 61* Battle Tank and put into production in 1962.

The *Type 61* tank has a conventional configuration. The driver is in front. The tank commander, gunner and loader are in normal locations in the turret. The engine is to the rear.

The overall height is such that a low silhouette is presented. The interior is carefully designed, using human engineering principles, to give maximum crew efficiency and comfort. There is ample ammunition storage capacity. Economical and efficient use of the inside space allows weight reductions which are applied to the heaviest possible armor while remaining within the maximum weight limit. The front of the hull is rounded to eliminate bullet traps and to give optimum protection.

THE ENGINE

The development of a diesel engine for the Japanese Army began in 1932. Japan, lacking in petroleum resources, was attracted by the high thermal efficiency, refining advantages, minimal loss rate in storage and transport and the lower consumption rate made possible by the use of diesel fuel. Diesel engines increased the operational radii of the vehicles. The requirements for personnel and equipment for fuel supply were reduced. The added advantage of reduced fire hazards from backfires and enemy hits, although not originally anticipated, made for heightened crew morale.

By the end of World War II nearly all Japanese military vehicles were powered by a standardized family of diesel engines. This family of engines

featured standard design cylinders in varying numbers for different applications. Parts supply was simplified by interchangeability. These engines proved very successful in combat and were popular with the tankers. As a result of this military development, Japan is now a leading producer of commercial diesel engines.

Also during this period the Japanese Army learned that air cooling was a necessity. Extreme temperatures and the hard water found in many operational areas precluded efficient liquid cooling. Radiators proved difficult to locate and protect in armored vehicles. While there were some engineering problems associated with the original development of air-cooled engines, there were many advantages gained from their adoption. Among these was the elimination of thermal loss and the consequent improvement of engine efficiency.

The *Type 61* tank is powered by a Mitsubishi *12HM* 4-stroke, 90 degree, direct injection, turbo-charged, V-12 diesel engine. It is designed for efficient fuel combustion and high fuel economy. It has two intake and exhaust valves per cylinder and multi-hole injection nozzles. Each cylinder is screwed into the cylinder head. Two axial flow cooling fans are mounted on the top of the engine. Two injection pumps driven by the camshaft are mounted at the upper front. On each side of the flywheel housing there is an exhaust turbo-blower for supercharging. A boost control device prevents black exhaust smoke during rapid acceleration. All accessories are arranged to give ease of maintenance. The *12HM* engine is robust and highly reliable. Its output is 600hp at 2100rpm. This fully supports the mobility and agility required of the *Type 61* tank under the most arduous conditions.

THE POWER TRAIN AND STEERING

In order to minimize breakdowns and to simplify field maintenance, it was decided that mechanical components were to be simple and possess features which previous experience had proven to be practical.

The *A1* and *A2* prototype models had a torque converter, automatic transmission and a hydraulic steering system. Although these were attractive and simplified driver training, they were dropped on the *A3* and *A4* models because of excessive fuel consumption and the possibility that their complexity would lead to mechanical failure.

The transmission and the steering mechanism tested on the *A3* and *A4* prototypes were adopted. The transmission is synchromeshed with five forward



The diesel powered Type 61 tank exhibits an outward similarity to the American M48, but the Japanese battle tank differs from its predecessor in many ways.

speeds and reverse. An auxiliary transmission provides two additional low range speeds. The mechanical clutch is operated by a pneumatic servo-mechanism. The controlled differential clutch and brake steering mechanism was based on one used successfully in Japanese World War II tanks. While it does not permit pivot turns it is highly reliable and causes no power loss. The turning radius of the Type 61 tank is 10 meters (32.8 feet).

The Type 61 tank followed the universal practice of using a torsion bar with independent suspension. To prevent damping, shock absorbers were added. There are six road wheels on each side. The rubber sole track is 500mm (19.7 in.) wide. Ground pressure is 0.95 kg/cm² (13.6 lb/sq in.).

ARMAMENT AND OPTICS

The Type 61 tank has a 90mm main gun and uses a mount based on the United States version. It is manufactured by Japan Steel Works. Firing is by an electro-magnetic solenoid. The tube has a muzzle brake and is equipped with a fume extractor.

The driver has three refraction type periscopes. The gunner uses a six-power sighting periscope which is linked to the gun barrel. Auxiliary optics for the gunner are one four-power and one eight power direct-view device. The tank commander has access to a twelve-power one-meter spectrum line coincidence type rangefinder and a seven-power prism type periscope which can be traversed 360 degrees.

The Type 61 design uses a controlled differential clutch and steering mechanism based on one used in Japanese World War II tanks.





Type 60 Self-Propelled Recoilless Rifle displaying parallel 106mm recoilless rifles that can be lowered for concealed movement and raised quickly into firing position.



TYPE 60 SELF-PROPELLED 106mm RECOILLESS RIFLE (SPRR)

The flat terrain in Japan is generally used for growing rice. Natural thick vegetation growths and forests are scattered about the rest of the countryside. Both types of area restrict employment of large numbers of battle tanks. Consequently, it is important that the tanks be supported by small, lightweight vehicles armed with antitank recoilless rifles. This tactical requirement is a special feature of Japan's defensive combat principles. The requirement resulted in the need for a self-propelled recoilless rifle with the following capabilities: good traction over all types of terrain, low silhouette for unobserved movement, the ability to get into position and fire quickly and the ability to destroy heavy tanks with a single round.

Design of such a vehicle began in 1954. The Japan Defense Agency Technical Research and Development Headquarters was responsible for project management. Prototypes were developed by Komatsu

Manufacturing Co., Ltd., and Mitsubishi Heavy Industries, Ltd. Vehicles with different characteristics were designed and constructed by each corporation. In Komatsu's version (SS1) the engine was located forward while in the Mitsubishi model (SS2) the engine was in the rear. Both prototype models were completed in late 1955 and engineering tests and trials took place immediately. The test results of both prototypes were satisfactory in all respects. However, after conducting user tests it was decided that the SS2, with the engine in the rear and front drive, offered superior firing arrangements. After making a few modifications on the SS2, a production contract for two vehicles of a third prototype (SS3) was issued to Komatsu Manufacturing. The engine power output was increased and specifications called for a torsion bar and shock absorber combination for the SS3 prototypes. These were completed in 1956 and engineering trials began immediately. Thereafter three prototype models (SS4) with additional improvements were ordered from Komatsu. They were completed in 1959. The modifications incorporated into the SS4 were a further enlargement of the bore and stroke of the engine which increased the power output, improvement of the cooling capability by changing the position of the cooling fan and switching from clutch-brake steering to controlled differential steering. The SS4 prototypes were put through months of hot and cold weather tests under field conditions. The formal standardization of this prototype as the *Type 60 SPRR* took place in 1960.

The *Type 60 SPRR* affords overall armor protection for the crew. Periscopes facilitate crew vision. The two 106mm recoilless rifles, similar to the U.S. model, are installed parallel to each other in an elliptical cone mount of original Japanese design. The elevating and traversing systems combine hydraulic and electric devices. Elevation ranges from plus 15 degrees to minus 20 degrees. The weapons can be lowered for concealed movement and raised quickly into the firing position when needed. Traverse is limited to 30 degrees from center to either side. For greater deflection changes the vehicle itself can easily be turned.

A rangefinder, coaxial spotting rifle and optical sight ensure accurate fire. The recoilless rifles are actuated by a push button electrical firing system.

A shaped charge fin-stabilized antitank round giving maximum armor penetration is used. In addition, a rifled gun tube permits conventional high explosive shells to be fired.

Type 60 Armored Personnel Carrier weighing 10 metric or 11 short tons. Armed with .30 and .50 caliber machineguns, the Type 60 may be modified (below) for .81mm and 4.2 inch mortar transport.



THE TYPE 60 ARMORED PERSONNEL CARRIER

Basic plans for the APC were drafted in 1956 by the Technical Research and Development Headquarters. Based on these plans, design and prototype construction were executed by Mitsubishi Heavy Industries and the Komatsu Manufacturing Company.

The prototype developed by Komatsu (SU1) had a six-cylinder, horizontally opposed, diesel engine located in the forward part of the chassis. Mitsubishi's prototype (SU2) had an eight-cylinder, V-type diesel engine located in the right-center of the chassis. The prototypes weighed roughly 10 metric (11 short) tons and were armed with one .30 caliber and one .50 caliber machinegun. The fully armored protected vehicles had seats for a fully equipped squad of infantry. For easy troop access, the test models were equipped with large rear doors.

The prototypes were completed in August 1957. Tests and trials continued through 1958. The test results favored the SU2. After some redesigning a second SU2 was constructed. This model had the engine located in the left center inside the hull. After testing, it was standardized as the Type 60 APC and produced by Mitsubishi and Komatsu.

Modifications to the Type 60 have provided carriers for both 81mm and 4.2 inch mortars. Thus both mechanized forces and infantry enjoy the advantages of mobile close fire support.

We believe that Japan has overcome her post-war handicaps and attained her goal of catching up with the armor capabilities of leading nations of the world. The Type 61 tank was designed to be 10 metric (11 short) tons lighter than the M48. It has very good mobility and affords a comfortable cross-country ride for the crew.

It is of interest to note that the United States

Army first adopted an air-cooled diesel engine for a standard tank with the M60. The favorable results achieved correspond with the Japanese position originated and adopted a quarter of a century earlier.

Recently, it has been suggested that the firepower of the Type 61 tank is insufficient. However, considering the Japanese terrain and this tank's planned employment, it is a reliable and appropriate weapon.

Likewise, the Type 60 self-propelled recoilless rifle is well-suited for the national conditions of Japan. Further, it enjoys the special feature of an economical production cost. The Type 60 armored personnel carrier and its variations are of prime importance in organizing and equipping mechanized units. Overall, the development and standardization of all these vehicles has proven highly beneficial.

Japanese armor has been making steady progress. However, we should not be content with existing equipment. To ensure continued progress, Japan is now actively developing new armor for the 1970s.



TO INSURE

DOMESTIC TRANQUILITY



by Lieutenant Colonel Clyde H. Patterson, Jr.

The situation and experiences of the 2d Squadron, 6th Armored Cavalry Regiment depicted in this article are similar to those of LTC Keith Meyer's 1st Squadron in the 10th Precinct and LTC Ernest F. Jacobs, Jr. and his 3d Squadron in the 13th Precinct where the disorders began. The recommendations of the 2d Squadron are those of the regiment and have been enumerated in our after-action report. During the critical hours of the disorder, this regiment was deployed to Precincts 6, 9, 10, 12, and 13 to assist in restoring law and order to our Nation's capital. Superior communications and mobility made possible the rapid assignment and deployment of troop-size units from one precinct to another, as required. Therefore, in the tradition of the Cavalry, all troops were committed and no reserves were held.

Clayton N. Gompf

CLAYTON N. GOMPf
Colonel, Armor
Commanding

At 0001 on the morning of 5 April 1968, the 6th Armored Cavalry Regiment was alerted for possible deployment into the District of Columbia to assist in quelling the disorder growing there in the wake of the death of Dr. Martin Luther King. This article will discuss those steps taken prior to that time to ready the unit for this mission. Furthermore, the lessons learned as a result of the pursuit of this mission will receive special attention. The particular experiences of the 2d Squadron, 6th Armored Cavalry Regiment, will be used to illustrate key points.

The regiment's efforts to be effective in riot con-

trol began during the summer of 1967. The benefits of this training were first realized during the employment of the 1st Squadron at the Pentagon in October 1967.

Intensive unit training followed in the fall of 1967 during a three month field training period at Camp Drum, N.Y. It was through these months that the troop commanders, the platoon leaders and the NCO chain of command that would be so effective in Washington were developed. The first key ingredient for success there, as in any military operation, was aggressive, responsive leadership down to the squad level; leaders with the confidence to innovate

when faced with the difficult and unexpected. The Camp Drum training produced this kind of leadership. The leaders knew one another well, had respect up and down for one another, and were buoyed by a well-founded confidence in themselves.

In mid-January 1968, the formal preparation for riot control work was reinitiated at Fort Meade. A special tailoring of the squadron was instituted to better support this unique mission. In addition to the squadron headquarters, four identical troops were formed. The riot control troops were built around a rifle squad of 11 personnel with some specialized equipment for this mission. The troop was organized so as to put the maximum number of men on the streets. The fourth squad in each of the three platoons furthered this purpose. It was felt that the duration of any employment in the civil disorder role would be brief and that the normal troop overhead would not be needed. Proximity to Fort Meade, with the squadron's normal support less than an hour away, made this a highly workable arrangement.

Each troop began its riot control training using basic riot formations and techniques. Weekly training schedules provided some six to eight hours of this work. Troops were briefed carefully about the psychological impact on a mob of the appearance of a highly disciplined military body in full battle dress, displaying the weapons and special equipment associated with this activity. This special equipment included nightsticks, canvas bags for CS grenades and riot control agent dispensers.

The confidence of the soldier in himself, his gear and his unit is critical to success in riot control. The soldier and his unit often find themselves heavily outnumbered. Training, discipline and special equipment provides the means to effectively overcome this numerical disadvantage.

Progressing normally, training moved from the squad through platoon to the troop level. Exercises were held wherein every item of gear contained in the special authorization tables for a riot troop was assembled and inspected. Particular attention was paid to communications. By late March 1968, the prime ingredient for the mission had fallen into place—the organized and trained riot control troop.

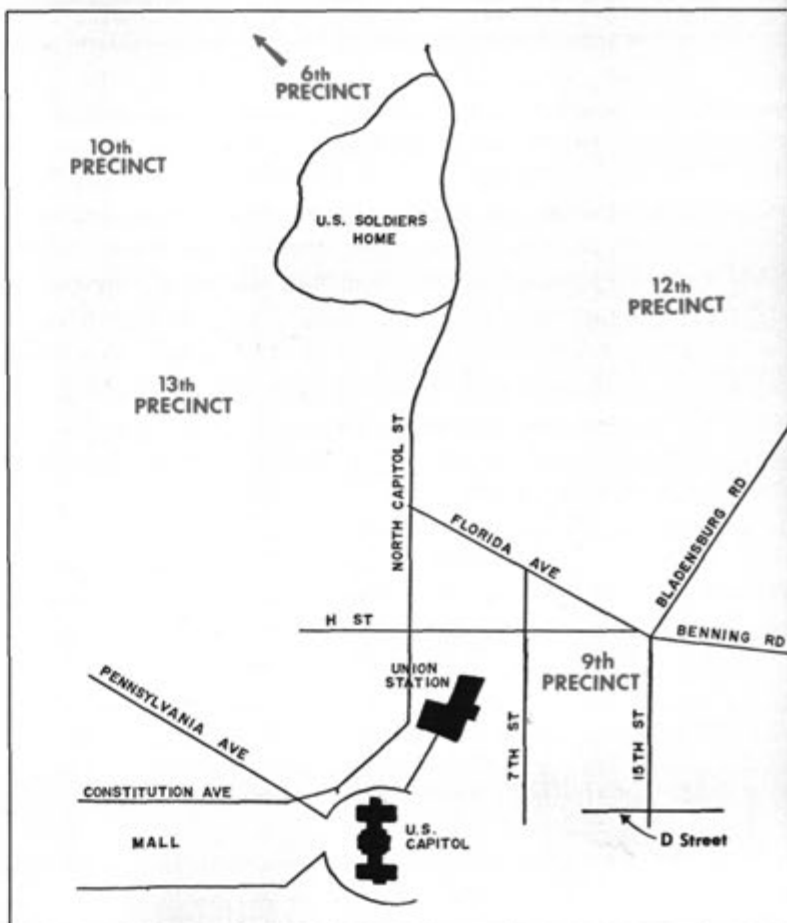
While the troop training was in progress, civilian authorities gave wholehearted endorsement and cooperation in aiding commanders and key staff members with advanced reconnaissance visits to various areas of Washington. Detailed planning was accom-

plished and close working relationships were established with police officials. Assembly areas and likely command posts were tentatively selected. And, suitable maps were obtained.

As April approached, more detailed and intensive preparation was made. This included special attention to up-to-date alert rosters. The large numbers of personnel, including key people, who lived off the post in the civilian communities surrounding Fort Meade made this essential. At this point, carefully packed alert bags of personal gear were readied by all personnel.

Earlier planning had indicated that major problems might not be expected before late April. The aftermath of the death of Dr. King, however, drastically changed matters and resulted in the alert on 5 April. The status of the regiment quickly moved to that of a requirement for one unit to be prepared to move within 30 minutes. This situation persisted until 1500 on the 5th when the order was received for the 2d Squadron to move into an assembly area on the grounds of the United States Soldiers Home.

Within 20 minutes Troop E was bound for this assembly area. The remaining troops, as individual march units, moved at five minute intervals using organic wheels, five M113 personnel carriers, and support wheeled vehicles from post units. This transport would remain with the squadron, tightly integrated into the units down to squad level, throughout the operation.



Troop E, with the squadron command element, closed into the assembly area at 1700. The last line unit, Troop F, would close by 1815. As the units entered the outskirts of the city and approached the Soldiers Home, the extent of the disorder in Washington was obvious. Columns of smoke from large fires could be seen everywhere to the west, southwest and south. Reports indicated that rioting and looting were widespread.

The situation had worsened significantly since the decision had been made to move the squadron into the city. As the lead elements of the squadron closed at the Soldiers Home, the decision for immediate deployment was reached. The first three elements (Troops E and G and the Howitzer Battery) were issued instructions by the regimental commander, Colonel Clayton N. Gompf, "to proceed immediately to the 9th, 13th and 10th precincts respectively and to take the actions necessary to restore promptly law and order in assigned areas in conjunction with the local police officials."

At the time of the issuance of this order, authority was also granted to fix sheathed bayonets and to use CS munitions, when deemed necessary by the officer on the spot. Ammunition was issued to all personnel with instructions that no ammunition would be loaded or used without specific approval by an officer except that if a trooper should find himself in a situation wherein his own life was endangered, he could then use his weapon in self defense. Thus, the trooper entered into the action braced with the confidence that he would be able to use that force necessary to meet the threat encountered. This would prove to be the second ingredient vital to successful operations.

By 1730, the last of the three troops had moved to their assigned precincts. Troop F was moving into the assembly area and readying itself for deployment. The 2d Squadron was widely spread, at this time, due to the critical nature of the situation. The 1st and 3d Squadrons were already moving to close into the assembly area. The entire regiment was soon to be committed.

The environment encountered in the precincts where E, G, and How Battery were committed varied in some detail. There were, however, more similarities than differences. Since the 2d Squadron would soon redeploy all elements to the 9th Precinct, the situation there upon the arrival of Troop E would be most illustrative of the nature of the problem in the operating area. The situation as that troop, commanded by Captain Daniel E.

Spielman, first arrived in the 9th Precinct was:

THE AREA

► Large, uncontrolled fires burned along H Street NE between 6th and 15th Streets.

► The entire area within two to three blocks on either side of H Street was filled with acrid smoke and gases from fires which, when later combined with CS, made it difficult to operate without protective masks at various points.

► H Street and cross-streets and alleys behind H Street, were becoming filled with rubble from the fires. Merchandise of all types could be found lying everywhere.

► Large quantities of civil fire fighting apparatus along H Street were parked at all angles with hoses everywhere restricting military vehicular traffic.

THE PEOPLE

► General chaos prevailed throughout the area bordering H Street, particularly in the eastern end and between 6th and 15th Streets.

► An estimated 5000 people were on the streets in the area. These consisted of widely disparate groups ranging from two to 100 people actively breaking into, looting and setting fires to various stores.

► The attitude of the people was belligerent upon the entry of the military forces. Some carried clubs. Rubble and debris were thrown at the troops. Verbal taunts and abuse were common.

► The civil populace on the streets was of all ages, male and female. A majority of those engaged in looting and burning were teenagers and young adults.

► Rioting elements were interfering with fire-fighting efforts. People attempted to block fire equipment from moving and abused the firemen by throwing rubble.

► The crowd psychology had progressed to the point of frenzied, indiscriminate looting. What one picked up did not appear important. People seemed obsessed with just having something.

At this point, the civil police, greatly outnumbered, were no longer able to maintain effective control in the area. They remained on the street in small groups, essentially at intersections crossing H Street, attempting to prevent civilian personnel from moving along or across H Street. Their prime

interest at this point appeared to be to protect the harassed firemen and the fire equipment.

The situation was chaotic. Law and order had completely broken down. The initiative was in the hands of the mobs where it had been for several hours. If looting and the accompanying drinking continued, the situation could only get more hopeless. Therefore, Troop E took immediate action.

As the troop moved into the precinct along Florida Avenue, many huge columns of smoke indicated big problems along H Street. At this time the Troop Commander decided to move directly to the columns of smoke.

At Florida Avenue and 13th Streets NE, the troop encountered a crowd of more than 100 people looting stores. There were no police in the area. One squad was dropped off at this location and quickly brought the situation under control with liberal use of CS. The crowd at this location was very hostile and one individual attempted to strike the troop commander with a two by four while shouting oaths.

At H and 14th Streets, the site of a large fire, the troop commander coordinated with the police as the troops rapidly dismounted and formed for action. After a brief discussion the troop commander quickly deployed the troops.

One platoon sealed off the eastern end of H Street and broke up all mobs in that area by employing CS aggressively. This platoon then systematically began to detain looters and people with contraband. The other platoons moved west along H Street to 8th Street, dispersing mobs and detaining looters. Six to eight troopers were dropped off at each intersection to move the mobs beyond the alleys which ran behind the stores on H Street.

The actions taken by Troop E made the initial inroads into the chaos that prevailed. While order was by no means fully restored, the crowds had been thrown off stride by a small, aggressive, disciplined force. To accelerate this process Troop F was committed to the 9th Precinct at 1830. While on the move in, the Troop F commander, Captain Timothy F. Donovan, effected liaison with Troop E by radio. Coordinating points along H Street were established. This meant, in effect, a doubling of the force in the area with the two units extending along H Street from 7th to 15th Streets with some elements of Troop E beyond 15th.

The actions of Troops E and F in their respective areas followed the pattern begun by Troop E. The large groups of rioters were being dispersed. Any

looters apprehended were detained only until the very active civil police arrest teams arrived. The precinct police took all detainees quickly off the hands of the units, giving them the flexibility to move immediately to the next problem area.

The commanders on the scene at the outset determined that the situation did not lend itself to employment of the formal riot formations to quell the disorder. H Street is about 150 feet wide. All actions quickly evolved down to the platoon and squad level where standard infantry tactics for built-up areas were appropriate. Aggressive and positive leadership was essential and it was present. The authority to use CS munitions, granted before commitment of any elements, contributed decisively to the effectiveness of the operation. This bolstered the confidence of the force.

As soon as it was relieved by the 3d Squadron, Troop G, commanded by Captain John J. Johnston, Jr., was diverted to move to the western sector of H Street, from 3d to 7th Streets, and to restore law and order there. Troop G arrived at 2130. Then that portion of H Street in the 9th Precinct, in which were located hundreds of small shops and stores and which was the focus of the major problems in the 9th, was completely covered. When relieved by the 1st Squadron, the 2d Squadron Howitzer Battery, commanded by Captain Joe C. Mayfield, was deployed to the 9th along Bladensburg Road. This area had not suffered much damage during the day, but it contained many potentially lucrative targets to include a large Sears store and several large warehouses.

The one area remaining to be covered was a three square block complex of produce and meat wholesale warehouses. This area was the focal point for the entry of the major portion of all foodstuffs into the District. Police officials expressed special concern for the security of this area. Here, as in all cases, a detailed knowledge of the area on the part of the police provided the basis for military deployment. The Aero Rifle Platoon of the regimental Air Cavalry Troop was given the mission to secure this important complex. Throughout the remainder of the time in the 9th Precinct, this platoon, commanded by 2LT Allan W. Estey retained this mission.

Later, a military police company of the D. C. National Guard was also attached to the squadron. Initially numerous problems of coordination and communications were encountered, but these were rapidly resolved. The National Guard troops and

the squadron gained valuable experience through their association.

By 052000, the initiative had been restored to the proper authorities. By 052400, the approximately 700 personnel of the squadron who were on the streets had restored law and order. By 060300 April, the streets were empty of people except for the police, the fire department (still fighting large fires) and the military. It was now possible to phase units out for much needed rest.

From this time on, the situation in the 9th Precinct was under full control. Saturday, 6 April, brought large crowds out by mid-morning. There were incidents. Some sporadic looting occurred. Fires continued to burn and one major fire was set at 15th and D Streets. Each incident was met quickly and firmly and with the same determined force which had established respect the night before. Secondly, application of CS reduced the problems encountered. Furthermore, the police had regained full effectiveness. By 1500 on Saturday, the precinct was relatively quiet and there no longer was any concern that the strife of the previous afternoon might recur.

Saturday night was tense, but quiet. The 2d Squadron was notified at 062100 that a battalion of the 2d Brigade, 82d Airborne Division would relieve it in place effective 070700 April. During the night, commanders of the two units coordinated the turnover with civil police officials present to participate in all decisions. As the 82d units phased in, 2d Squadron elements remained on station, down to squad level, until the relieving unit was thoroughly briefed and oriented on the area and on the experiences of the previous 38 hours. The relief was concluded on time and the squadron departed for a reserve status in the 6th Precinct, leaving a 9th Precinct that was very quiet.

The 38 hours in the 9th Precinct comprised a unique experience for the squadron. All had learned a great number of useful lessons. Among these were:

- The means to assess a deteriorating situation quickly and the mechanism to call for forces to preserve law and order must be improved.

- Aggressive and large scale use of CS in the early stages of a riot is the key to the quickest restoration of order in an area.

- Military forces in a precinct must be under the control of the senior military commander. The military commander who holds the preponderance of force, should have final authority in points of policy.

- Any unit with a riot control mission will require special equipment to augment the normal TOE items to include civil hand radios, lightweight powered megaphones, high powered flashlights and so on.

- Billeting arrangements in educational institutions in the city are essential to maintain the physical well-being and appearance of the troops.

- A well-enforced curfew, with simple rules and minimum exceptions which are understood by all, can provide material assistance to the military force and police.

- Properly managed, the personnel carrier can free personnel from the center of streets and provide an effective psychological weapon when dispersing crowds.

- A trained TOE unit with extensive riot control training may be given maximum latitude in employing only the force necessary to the restoration of law and order.

- Early efforts to secure specific stores, areas or fire equipment thus fragmenting the force available, must be avoided. Immediate and successful steps to disperse the large unlawful elements will impart the security desired for critical points.

- Properly trained, led, and equipped, the riot control force can be successful without resorting to the use of live ammunition even when vastly outnumbered.

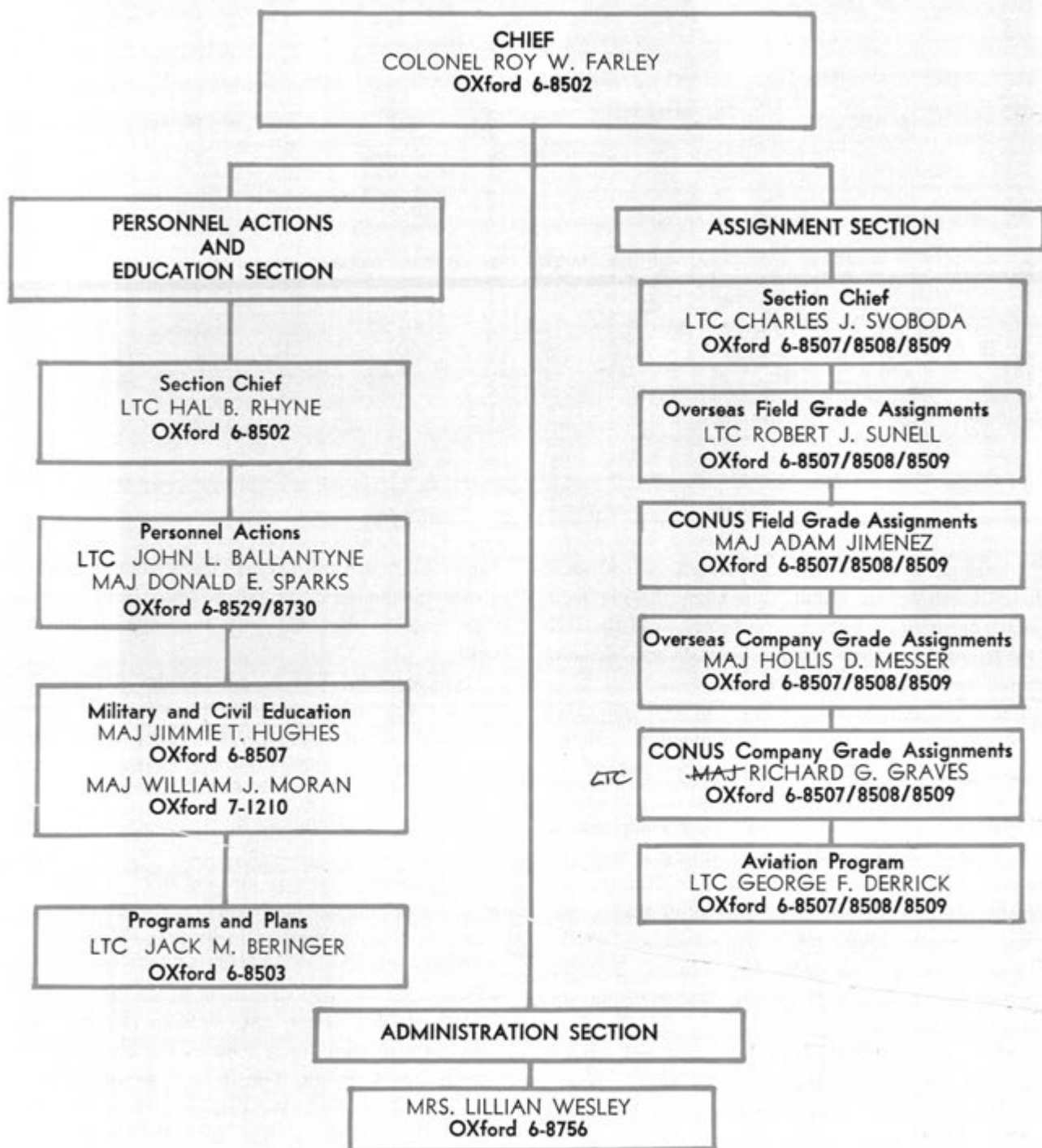
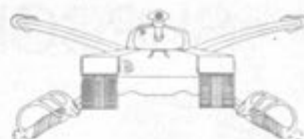
The oldest of military truisms was again proven valid by the experiences of the regiment while in Washington. Regardless of the mission or the locale, the success or failure of an operation will rest ultimately on the effectiveness of the leadership at the lowest levels and the responsiveness of the trooper to that leadership. Throughout the early critical hours, each unit demonstrated clearly that its leadership was capable of meeting the many, and unusual, challenges faced by the junior officer, noncommissioned officer and trooper. The overall training of the young soldier prepared him splendidly for the task. In addition, the reservoir of extensive military experience with the squadron paid unquestioned dividends.

Already, the units that went to Washington have changed as the unending in and out flow of troopers continues. However, the lessons learned in the District have become a part of the regiment.

These lessons form the basis for operational procedures and training therein which will insure that the successes of April 1968 will be repeated should it be necessary for the 6th Cavalry again to undertake a civil disturbance mission.



ARMOR BRANCH DIRECTORY



The branch is located in Wing 3, Tempo A, on the corner of 2d Street S.W. and "V" Street. Tempo A flanks Fort McNair on the east. It can be reached readily from the Pentagon by shuttle bus. If you're driving your own car, Maine Avenue or South Capitol Street are the best approaches. Visitors parking is available in rear of the building. ADDRESS YOUR LETTERS TO: Office of Personnel Operations, ATTN: OPD-OPAR, Headquarters, Department of the Army, Washington, D. C. 20315.

SUPCOM SUPPORTS



Imagine a maintenance company so versatile that it can repair armor equipment ranging from machineguns to trajectory computers. Add the ability to perform fast, around-the-clock maintenance in all types of weather and terrain.

A tank commander's dream? In Germany such service is a reality. Armor commanders standing guard on the West German border depend on Seventh Army Support Command's (SUPCOM) eleven heavy equipment maintenance companies to do all these things, and more. The largest and most technically-sophisticated command in Europe, this command is a highly trained jack-of-all-trades, performing tasks which range from running bakeries to overhauling data processing centers. Servicing armor, however, is perhaps the most vital and difficult of these tasks.

Two armored divisions, two mechanized infantry divisions and two armored cavalry regiments rely on SUPCOM for supply and repair. By using a track vehicle exchange program, the command insures that these units are always fully equipped with combat ready vehicles.

But what about that "fast, around-the-clock maintenance in all types of weather and terrain?" Eleven heavy equipment maintenance (HEM) com-

panies guarantee this service. Each has a number of armor maintenance specialists who spend most of their time in the field with the supported armor units.

Typical of the fine support by the eleven heavy maintenance companies in SUPCOM is that of the 42d HEM Company. Operating from Merrell Barracks, near Nuernberg, the 42d performs maintenance for combat units near and far. During a recent armor field training exercise at the Seventh Army Training Center, Grafenwoehr, a nine-man team from the 42d was hustling through mud and rain, performing instant repairs on armored vehicles. Most were tanks engaged in livefiring exercises.

The mobile team covered ten firing ranges. "We're so busy that the men sleep right in the repair vans," said the team's leader, SSG William Deason. "The men get mail about once a week, and get to the PX about once a month. You don't hear any of them complaining, though. We can go over to the main camp most anytime we want to, but we feel we have more important things to do."

All the mobile team members are volunteers. They left the rest of the 42d's 60-man armament platoon in garrison. The unit's mobile teams are only one part of a much larger operation, centered



at Merrell Barracks. The bulk of the 42d's work is done there.

Some of "the important things" the maintenance men were dealing with at Grafenwoehr were 120 tanks of the 2d Armored Cavalry Regiment. In 20 days, the team completed 381 major repairs for the tankers.

These repairs included work on such complex equipment as gunsights, periscopes, infrared components, and trajectory computers. Much of the work was done while the tanks were right in the middle of a firing exercise. If a tank moving through the course developed trouble, team members responded on the double. Making repairs or adjustments as fast as possible, they also determined whether or not the tank crew had a legitimate mechanical alibi. Sometimes parts or guns had to be pulled out of the tanks and fixed back in repair vans.

The maintenance teams live and work right on the firing ranges with the unit they are supporting.

"Sure, we work hard," said SP4 Bob Devers, "but we don't mind. The time just flies by. Besides, we know we're doing a worthwhile job out here. We can see the results—these tanks wouldn't move without us."

Odd hours, broken only by snatches of sleep, are normal. PFC Dan Willey, arms repairman, was



working on a .50 caliber machinegun on one of the vans. "I was up at one o'clock this morning, fixing machineguns as fast as I could go," he said. "A squadron was going through night firing and we were plenty busy."

"We don't mind the fast pace and hard work," explained SP4 Devers. "We're so busy most of the time we don't even know what day it is. Sometimes I'm driving through a village and see dressed up people walking—then I realize it's Sunday."

The teams are highly appreciated by field commanders. LTC Paul R. Palmer, commanding officer of 2d Squadron, 14th Armored Cavalry, praised them saying that they give his outfit "good support, all the time. We're shooting straight, with guns and instruments that work fine."

The field teams have proved invaluable to combat units since most of these supported units do not have the specialists or the equipment to perform complicated repairs. The HEM company field teams provide general support, sophisticated repair that cannot be handled by the direct support maintenance companies. Due in large part to the expertise of, and the service given by, SUPCOM units, American armor in Europe stands ready before the massive array of Russian armor poised along the Iron Curtain.

MAJOR GENERAL LAWRENCE E. SCHLANSE was born at Fort Shafter, Hawaii. Upon graduation from the United States Military Academy in 1935 he was commissioned a second lieutenant of Cavalry and assigned to Fort Riley, Kansas, where he served with the 2d and 13th Cavalry and the Cavalry School as both an instructor and a student.

On 1 January 1944 he assumed command of the 19th Cavalry Reconnaissance Squadron which he led in World War II combat in Europe.

Following a tour with Army Ground Forces Board #1, in 1946 he returned to Europe to command the 1st Con-

stabulary Squadron and the 2d Squadron, 2d Cavalry.

Then came service on the Army General Staff, with the faculty of the Armor School and in Korea together with graduation from the Command and General Staff College, the Armed Forces Staff College and the Army War College. Then Colonel Schlanser returned to Europe in 1959 to command the 2d Armored Cavalry Regiment and the Seventh Army Training Center at Vilseck. Subsequently, General Schlanser was Deputy Commanding General US Army Test and Evaluation Command and Chief of Staff of Eighth Army in Korea. He now commands the Seventh Army Support Command in Germany.



NEWS NOTES



**MAJOR GENERAL SUTHERLAND TAKES COMMAND
OF ARMOR CENTER**

Major General James W. Sutherland, Jr. is the new commanding general of the Armor Center.

General Sutherland entered active duty on 5 July 1940. After graduation from the Infantry School he reported to the 6th Armored Infantry, 1st Armored Division at Fort Knox. He remained with that unit for the next three years, participating in combat in Algeria, Tunisia and Italy. He was wounded at Anzio in June 1944 while commanding the 2d Battalion.

Thereafter he joined the Armored Board at Fort Knox. In June 1947, he was transferred to the Research and Development Division of Headquarters Army Ground Forces at Fort Monroe.

Upon graduation from the Command and General Staff College, in June 1951, he was assigned to the Army Section of the Military Assistance Advisory Group, Belgium. In July 1954 he returned to the 1st Armored Division, then at Fort Hood, for duty as executive officer, Combat Command B (CCB), and later commander of the 100th Tank Battalion. Upon promotion to colonel in 1955, he went to the Pentagon for duty with the Army Staff.

After graduation from the National War College in June 1959, he commanded CCB, 3d Armored Division until December 1960 when he reported to the Operations Division, Headquarters USAREUR. Promoted to brigadier general, he next commanded the U.S. Army Combat Developments Command Experimentation Center at Fort Ord.

General Sutherland received his second star on 1 August 1963 and was assigned to command the U.S. Army Test and Evaluation Command, Aberdeen Proving Ground. He became commanding general, 4th Armored Division, in December 1965 and Deputy Chief of Staff for Operations, USAREUR and Seventh Army in May 1967.



MAJOR GENERAL COWLES TAKES COMMAND OF SPEARHEAD

Major General Donald H. Cowles has assumed command of the 3d Armored Division in Germany.

Following graduation from the University of Massachusetts and award of a Masters degree from Yale, General Cowles entered active duty on 9 March 1942 as a 2d lieutenant of cavalry. He joined the 4th Armored Division and served with the 84th Reconnaissance Battalion (later redesignated the 25th Cavalry Reconnaissance Squadron, Mechanized) throughout World War II, participating in the Normandy Breakout and five campaigns in Europe.

After World War II, and attendance at the Armor Officer Advanced Course, he returned to Germany and was U. S. Constabulary G3 project officer for the establishment of the Tank Training Center at Vilseck.

After graduation from the Command and General Staff College, he commanded the 81st Reconnaissance Battalion of the 1st Armored Division and the 1st Tank Battalion, 1st Cavalry.

In 1954 General Cowles was assigned to the Army Staff. Next he attended the Army War College. Thereafter he served as aide-de-camp to General I. D. White then CINCUSARPAC.

In the summer of 1961, General Cowles assumed command of the 3d Armored Cavalry Regiment at Fort Meade, Maryland and subsequently deployed the regiment to Germany during the Berlin Buildup of October 1961.

He returned to the United States in 1964 for assignment as Assistant Chief of Staff, U. S. Army Continental Army Command. Prior to joining the Spearhead Division, General Cowles served for three years with the Army Staff, the Joint Chiefs of Staff and the Department of Defense in Washington.



INTERNATIONAL ARMOR AMITY

Buying a tank is like buying a car for the German Army. The Germans insist that a tank be guaranteed for one test firing or six months, whichever occurs first.

And, according to the terms of the contract between the West German government and the manufacturer, a factory technician is assigned to Panzer units firing the Leopard. He investigates all reports of malfunctions, makes any possible corrections in the field, or orders the tank returned to the factory.

For the 5th Panzerdivision, sister division of the 3d Armored (Spearhead), this novel approach presented quite a problem recently. Major General Bernd Freiherr Freytag von Loringhoven, 5th Panzer commander, found himself with a shipment of tanks whose guarantees were expiring and no ranges which were large enough to accommodate the initial firing.

To get his new Leopard tanks tested before the guarantee date closed in on him, General von Loringhoven called Major General W. G. Dolvin, then Spearhead command, and asked if he could borrow a range at Grafenwoehr, where the Spearheaders were training. General Dolvin agreed, and a schedule was arranged.

In response to an invitation from General Loringhoven, General Dolvin visited the firing and inspected the new Leopard tanks as they were being tested. This marked the last meeting of the two division commanders as such. Shortly thereafter, General Dolvin departed the 3d Armored Division to become CENTAG Chief of Staff.

**194th ARMORED BRIGADE REACTIVATED
16th ARMOR GROUP COLORS CASED**

During 17 April 1968 ceremonies at Fort Knox, the 16th Armor Group was inactivated as its missions and units were taken over by the concurrently reactivated 194th Armored Brigade. Colonel Robert L. Freeland, former group and new brigade commander, passed the 16th's standard to be retired to Major General A. D. Surles, Jr., then Armor Center Commanding General and now CONARC Chief of Staff. The 194th Brigade standard was then unfurled for the pass in review.

The 194th Armor Brigade has six battalions assigned. These are the 6th Battalion, 32d Armor; 5th Battalion, 33d Armor; 4th Battalion, 37th Armor; 4th Battalion, 68th Armor; 4th Battalion (Mechanized), 54th Infantry; and the 3d Howitzer Battalion, 3d Artillery. Other brigade units, in addition to the Headquarters and Headquarters Company, are: Troop D, 10th Cavalry; Troop I, 17th Cavalry; Troop D, 32d Armor; and the 522d Engineer Company.



ARMOR ORIENTED CADETS FORM ASSOCIATION

The cadet members of The U.S. Armor Association on the campus of the University of Eastern Michigan, Ypsilanti, have formed an organization of ROTC cadets who are interested in Armor. The group is advised by Major James A. Tipton, Armor, and headed by Cadets Robert Kainz, Curt Brown and Dayle Mummey. These cadets see a need to expand the ROTC cadets' knowledge of Armor. This is being done through guest speakers, movies, and group discussions.

The cadet Armor group on Eastern's campus has 25 members and is growing fast.

This year the cadets are sponsoring two field trips, one to Fort Knox and a second to the Automotive Tank Center (ATAC) in Warren, Michigan.

The cadet Armor group at Eastern wants to get in touch with similar groups at other ROTC institutions. The contact is Cadet Robert J. Kainz, 29958 Pipers Land, Farmington, Michigan 48024.

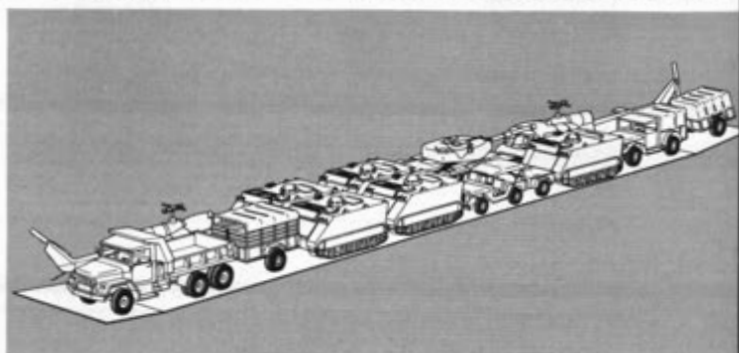
C5A = AIRMOBILE ARMOR

The unveiling of the new Air Force C-5A Galaxy presages a new dimension in air deployability of Armor units. With a length of 246 feet and wingspan of 223 feet, this supercargo airplane can transport 220,000 pounds for 3050 nautical miles at 440 knots. Under these conditions 7500 feet or runway are required for takeoff but only 4200 for the landing.

The 34,734 cubic foot cargo compartment has self-contained landing ramps. Its structural strength and 13.5 foot height and 19 foot width permit combination loads consisting of M60 tanks, AVLBs, M113 APCs and so on. In addition, up to 75 troops can be carried in a separate compartment at the same time.

The first Military Airlift Command squadrons equipped with the C5A are expected to become operational in 1969.

Shown at right is one load possibility. This load includes two UH-1D helicopters, one M60 battle tank, five M113 armored personnel carriers, one M59 2½-ton truck and trailer, one M151 ¼-ton truck and trailer, and one M37 ¾-ton truck and trailer.



The XH-51A

10TH ARMORED VETERANS TO HELP BUILD NEW PATTON MUSEUM

A two-pronged thrust of donations by individual members and the 10th Armored Division Veterans Association is designed to memorialize fallen comrades and the division. Headed by Colonel James O'Hara, USA-Retired, who commanded the 54th Armored Infantry Battalion when it won a Presidential Unit Citation for gallantry in the Battle of the Bulge, a special committee has been appointed to insure that the Tiger veterans do their part toward making the proposed new Patton Museum a reality.

SWIFT HELICOPTERS HUG GROUND

Helicopters, hugging the ground at speeds up to 260 miles (416 kilometers) per hour, have further proved that rapid low-level flights are feasible as a combat technique. In "nap of the earth" tests conducted under a U.S. Army research contract, Lockheed-California Company pilots flew the helicopters at an average ground clearance of only 25 feet (7.5 meters) during the top 260 mph (416 km) runs and even lower at slower speeds.

Used in the trial runs were a Lockheed Model 286 pure helicopter, which flew from 60 to 145 mph (96 to 232 km), and the Lockheed-built Army XH-51A compound winged helicopter. Both have a rigid-rotor system.

Flights were over flat, rolling, and rough terrain, which included ridges, valleys, and mountains.

Purpose of the program is to increase the effectiveness of future combat helicopters by proving that nap-of-the-earth flying is possible at high speeds. Flying rapidly at the lowest possible altitude, a combat helicopter is an extremely hard-to-find and hard-to-hit target from the ground troop point of view. This was attested to by Army ground observers who tracked the low-flying Lockheed helicopters and noted the time available for weapon firing.

THE EXPLOSIVE ONE-PIECE FORMING CONCEPT ►

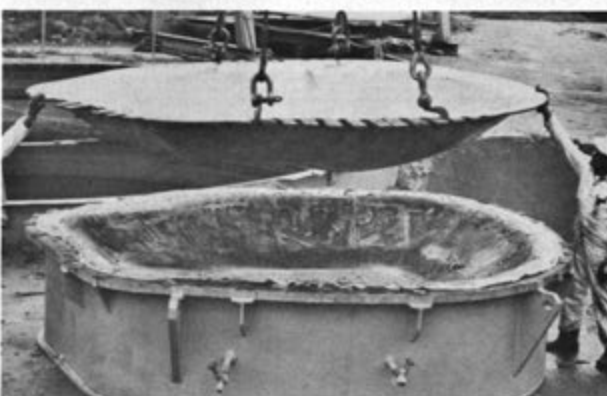
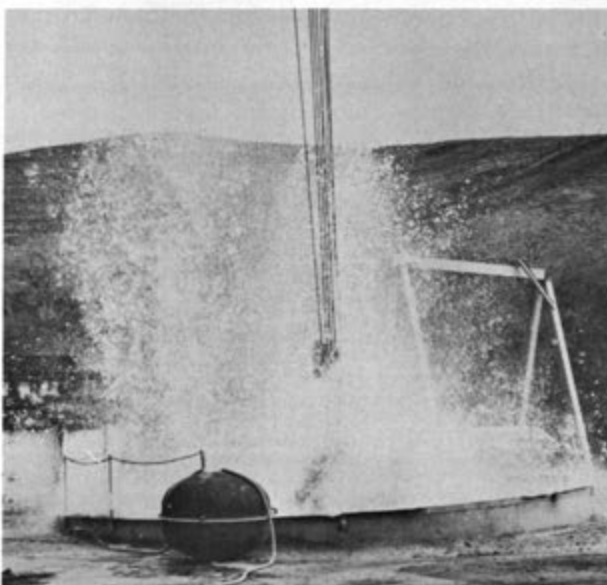
The U.S. Army Tank-Automotive Command (ATAC), Warren, Michigan, has begun evaluating the explosive one-piece forming concept as a production method for the manufacture of large complex contoured armored sections.

ATAC is scheduled to receive three pilot upper tank turrets from Aerojet General of Downey, California and three lower tank turrets from North American of Los Angeles. The two firms are completing contracts with ATAC to develop a feasible explosive forming production technique.

The new method involves the use of an explosive charge directed at a single die to form materials into specific contours in one operation. With the more conventional manufacturing methods currently used in the production of upper and lower turrets, as many as seven sub-assemblies are stamped out and then welded together to form a turret.

The explosive forming process takes place under water. The liquid acts as a medium to transfer energy-producing shock waves and gas pressure generated by the detonation of the explosive. A die, consisting of an epoxy and sand mixture, is poured into a steel beam-reinforced metal die or container. A steel face plate is formed over the die to provide rigidity. The flat steel armor plate to be formed is placed across the top of the one-piece female die and submerged in a water tank along with the explosive charge. A vacuum line leading up from the die to a pump holds the armor plate securely in place and keeps the contoured area of the die, under the blank, free of water and air. The impact or shock of the detonated charge forces the metal down into the contours of the die.

ATAC engineers will pay particular attention to the comparative advantages and disadvantages of one-piece formed turrets and conventionally formed turrets with welds before a final decision is reached on adoption of the explosive forming procedure.



FREE VIETNAM PACKET

Armor officers and senior NCOs can benefit from a Vietnam publications packet available from The Commandant, U.S. Army Armor School, Attention: Reserve-ROTC Branch, Non-Resident Instruction Division, Fort Knox, Kentucky 40121. The packet contains up-to-date information on lessons learned by Armor people in Vietnam.

ARMOR and its predecessors from Volume 1, 1887 are now available on microfilm or as Xerox copies. Interested individuals, libraries or others may obtain details from University Microfilms Library Services, Ann Arbor, Michigan 48106.

PATTON MUSEUM SEEKS EXHIBIT MATERIALS

The Patton Museum at Fort Knox needs additional articles to complete and enhance many of its collections.

Begun in the post-World War II era as a collection of captured enemy armor vehicles, the museum has continued to grow through the years. Plans are currently underway to build a new and larger building to house the Museum's increasing inventory.

Colonel Edward M. Majors, Patton Museum Director, states that many of the collections are minus only a few articles for completion. Particular needs are:

Tanks—M3 Grant or Lee medium, M3 Stuart light, and an M26 Pershing medium.

APC's—M39 Utility Armored Vehicle and an M44.

Armored Cars—M8 and early armored and scout cars.

Headress—"Mae West" brown (circa 1940) and pre-World War II garrison cap.

Fatigues—Pre-World War II blue and brown.

Footgear—laced cavalry boots and canvas leggings.

North Vietnamese uniform components, pistols, holsters, cartridge belts and a tank.

Books—Any books of military or historical significance and especially out-of-print armor field and technical manuals.

Prospective donors to the museum may personally bring or send items to the Office of the Curator, Patton Museum, Fort Knox, Kentucky 40121. If the items are too large to mail, they may contact the Office of the Curator by mail or phone (Area Code 502 624-6350) to arrange transportation.

ARMORED FIGHTING VEHICLE REFERENCES

Collectors of armored fighting vehicle data and illustrations as well as model makers have sent ARMOR a number of inquiries concerning the Armor in Profile Series and the Bellona Military Vehicle Prints. These two series cover a number of the world's armored fighting vehicles in use from 1917 to the present. Extensive technical data and historical information is presented. Our Book Department is unable to handle these references due to the necessity of stocking so many titles. Details may be obtained from John W. Caler, 7506 Claybourn Ave., Sun Valley, California 91352.



ELECTRONIC NAVIGATING SYSTEM FOR LAND VEHICLES

An electronic navigating system that can be used to provide exact headings and four-figure map references, with an accuracy of 0.5 percent of distance traveled in a one-hour trip has been developed by the AGA Company of Sweden. The system is designed for use in military vehicles, such as tanks, self-propelled artillery and jeeps.

Designated the AGA Navigating System, ANS-100, it is an electronic navigator comprising a display unit, a pulse generator and a DC-AC power converter. The display unit houses a solid state computer which is largely made up of integrated circuits and processes the directional and distance-run data. The vehicle's heading and position are presented on a compass indicator and four-figure counters, respectively. The pulse generator is connected to the vehicle's speedometer cable or gearbox and provides the distance traveled data.

Heading information is obtained from a separate directional gyro. The initial heading and coordinates are set on the instrument using a map and external references such as a landmark, sightline, transfer gyro or other. The heading is continuously displayed on the compass indicator expressed in either degrees or mils. The position is shown in the form of four-figure coordinates on illuminated counters, one for Eastings and one for Northings. Coordinates are shown to the nearest 30 feet.

The equipment is sturdily made for operating under severe conditions and weighs only 35 pounds. Power consumption is 70 watts.

BRITISH MILITARY PHOTOGRAPHS

Raymond E. Smith, 65 Ricardo Street, Longton, Stoke-on-Trent, England, British authority on armored fighting vehicles and ARMOR author, has available sets of high quality photographs of British and some other military equipment. These could be helpful to researchers, authors and collectors. Details are available from Mr. Smith.



(continued from page 17)

where enemy snipers were habitually placed, sometimes chained to their positions. Once the hedgerows were blown away, HE ammunition with delay fuze or HEP would be used against the enemy bunkers. The tanks would then physically drive over the bunkers with the loaders and tank commanders dropping hand grenades in as they went by. The infantry followed the armor assault at a distance of 75-100 meters to reduce pockets of resistance bypassed by the tanks. By 1900 the attacking forces had reached the southern end of the village. The entire village was then traversed from south to north a second time to ensure the elimination of the enemy force.

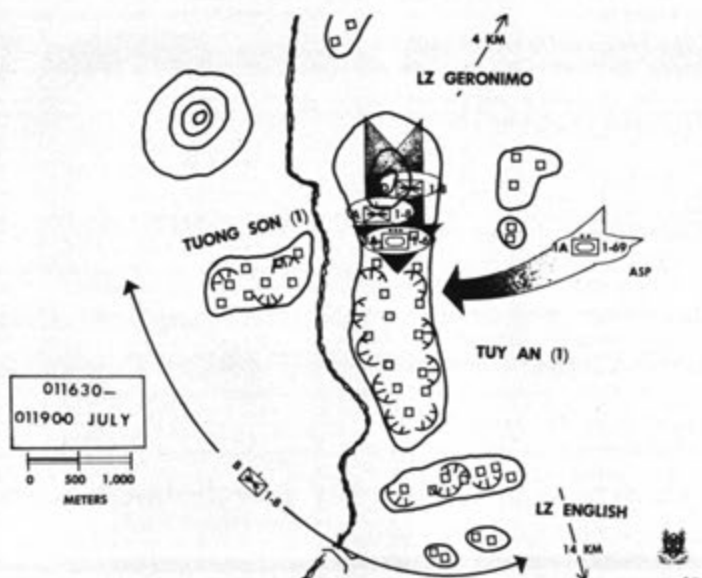
A complete search of the battle area over the next two days established a body count of 96 NVA killed in action. Three VC prisoners were taken. Captured enemy documents and interrogation of prisoners revealed the enemy to have been major elements of the 8th Battalion, 22d Regiment 3d NVA Division. Total US casualties were 15 killed and 39 wounded. Company A, 1/69 Armor had six men wounded. These were all tank commanders or acting tank commanders. The majority of the American casualties occurred during the initial contact in the southern

portion of the village or during the first phase of the attack prior to a foothold being established in the village.

The availability of armor protected firepower was the decisive factor in the total elimination of the enemy force. This is forcefully illustrated by comparing this battle with a similar one that had taken place in the same hamlet five months previously under the same circumstances with the one exception that tanks were not available. During that earlier battle, five infantry com-

panies were committed for five days with a resultant kill ratio of approximately one-to-one. During the five day period the majority of the enemy force were able to exfiltrate from the battle area.

Because armor protected firepower with its inherent shock effect and maneuverability was available in the second battle of Tuy An, the defending force was totally defeated in a nine hour period. This was in marked contrast to the less conclusive results achieved during the previous five day battle.



A COMBINED ARMS TASK FORCE IN THE ATTACK

by Lieutenant Colonel THOMAS P. LYNCH

former Commanding Officer, 3d Battalion, 8th Infantry, 4th Infantry Division

For the next few minutes, I am going to discuss the employment of a battalion combined arms force consisting of dismounted infantry, mechanized infantry, armored cavalry, air cavalry, artillery, tactical air, and Army aviation in an action which occurred west of Pleiku along the Cambodian border in the Central Highlands. Since 14 July 1967, the 3d Battalion, 8th Infantry, had been conducting border surveillance and search and destroy operations between the Duc Co Special Forces camp in the northwest to the Cambodian border and south to the Ia Drang River Valley. The battalion Tac CP,

Company A, one battery of 105mm towed howitzers and a battery of 155mm self-propelled howitzers were located at the fire support base while Companies B and C were located in the vicinity of Plei Ya Bo.

At 1700 on 22 July, I received information that a large North Vietnamese unit was crossing the border into South Vietnam, approximately 10 kilometers south of Companies B and C. In order to prevent a surprise attack in my area of operations and to provide early warning, I directed increased night ambushes and daylight patrols be established around all bases during the night of 22 July

and through the day of the 23d. Patrols and ambushes were to proceed in a cloverleaf pattern 2000 meters beyond the base area. Through the night of 22 July, we had no contact with the enemy force. At 0700 on 23 July, daylight patrols departed all base areas. At 0730, accompanied by the artillery liaison officer, my sergeant major, and one rifleman, I left the fire support base (FSB) aboard the command and control chopper to conduct a visual reconnaissance of the area of operations and to brief the commanders of Companies B and C. We returned to the fire support base at 1030 to meet with the bri-



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gade commander.

At 1150 I received a report that the 3d Platoon of Company C was in contact with an NVA platoon. Immediately upon receipt of this report, I left the FSB with the command group described earlier. While enroute to the contact area, I monitored a report that the 3d platoon was now under attack by an NVA company. At 1154, four minutes after the first contact, a battery each of 105s and 155s began firing for Company C. By 1200 all of Company C was under attack.

I then directed Company B to link up with Company C. At the same time, I requested all available Tac Air, gunships, and artillery. I directed that Company A be prepared to conduct an airmobile assault. Then, in conjunction with the artillery liaison officer, we started placing artillery and Tac Air fires 200 meters from the contact area. In accordance with our battalion SOP, the company commanders and ground FOs controlled all fires from zero to 200 meters out.

Between 1206 and 1500 hours, the following occurred. The 3d Platoon of Company C was overrun. Company C had received three wave attacks which were repelled by hand-to-hand combat, 105 artillery fire placed within 50 meters of their positions, gunships firing within 50 meters and 500-pound bombs and napalm being dropped within 100 meters. During all Tac Air and gunship strikes, the artillery continued to fire. I might point out that we were receiving artillery fires from Duc Co, my FSB, the 1st brigade FSB, and the 1/12 Infantry FSB. Therefore, Tac Air and gunships conducted their strikes through gun target lines into target corridors which we created by shifting artillery fires, not by lifting them.

In seven and one-half months of commanding an infantry battalion in combat, not once did I lift artillery fires to put in an airstrike or gunship. I might also point out that all maneuvering of forces and employment of fires was controlled by the command group in the command and control chopper.

Now back to the ground action which occurred between 1206 and 1500. Company B was pinned down twice in the move to link up with Company C. Company B was only able to move through the use of fire and aggressive maneuver employed by an Armor captain commanding a rifle company. Companies B and



C linked up and started to attack to the south. Troop B, 1/10 Cavalry, Company B, 2/8 Inf (Mech), an aeroscout section of Troop D, 1/10 Cavalry, and Company A, 3/12 Infantry were placed under my operational control and moved into my area of operations (AO). Additionally, my Company A moved by chopper to the contact area and my recon platoon moved to the north of the control area.

From 1500 to 1700, we continued to attack. I was able rapidly to seize the initiative due to the rapid reaction of the armored cavalry, air cavalry and mechanized forces which were moving into my AO 10 minutes after receiving the go order from division.

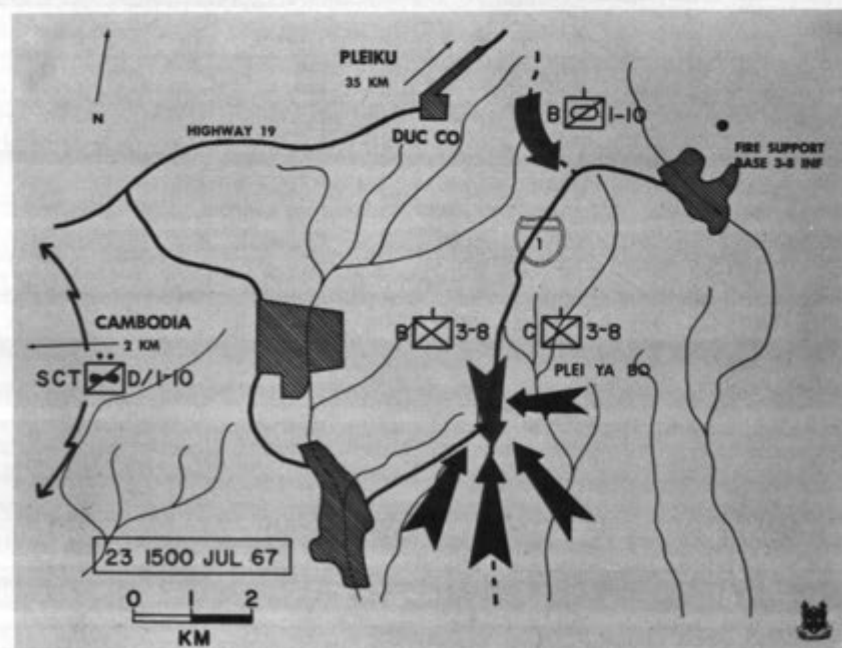
At 1700 this entire combined arms force continued to attack against light

sniper activity. That night and for the next five days, we continued to move south and west in an attempt to re-establish contact and police the battlefield.

Now a quick summary of statistics. In the first 24 hours of this action, we lost 18 killed, all from the 3d Platoon of Company C and 37 wounded sufficiently to require evacuation. We were in contact with the 4th, 5th and 6th Battalions of the 32d NVA Regiment. Enemy losses were 184 killed by body count, 10 prisoners, 53 individual weapons and 13 crew served weapons to include the first two Soviet RPG7 rocket launchers captured by U. S. Army forces in Vietnam.

In this five day action, I commanded four rifle companies, one mechanized rifle company, an armored cavalry troop, and an aeroscout section. Additionally, eight artillery batteries fired 6688 rounds at the direction of my artillery LO. Twelve Tac Air strikes, three B52 strikes, and five hours of continuous gunship support were expended in the first 24 hours.

We were successful in this combat action due to a series of factors. First, the outstanding ability of the American soldier to fight. Second, through the rapid and proper employment of reaction forces and supporting fires, especially artillery, we rapidly gained the initiative. Third, throughout the entire action, I, the battalion commander with my command group in a chopper or on the ground commanded all units and controlled all fires. In turn, my subordinates commanded their respective units.





SUMMARY BY COLONEL COBB

This concludes the first half of the symposium. We hope that our presentations have been thought-provoking and we look forward to your questions during the discussion period. As you have recognized, our overall aim was to portray the effectiveness of mounted combat. The terrain and the enemy are the dominant factors that differentiate combat in Vietnam from the more conventional forms of warfare encountered during World War II and Korea. Doctrine, organization and equip-

ment, which have evolved in the past, are basically sound. Application has been altered and points of emphasis have been changed to fit the requirements of area warfare. The trafficability problems presented by the terrain are many and varied. However, they are being overcome by hard-working, imaginative leaders with true Armor spirit. The use of bridge equipment such as the AVLB and the application of numerous field expedients have enabled mounted units to open up numerous

avenues, thus assisting in isolating the enemy and crippling his flexibility and freedom of movement. I think General Westmoreland summed it up very well when he said: "The final story of mechanized infantry, tank and cavalry operations in Vietnam is still being written . . . lessons are being learned and new techniques developed during every operation. Each of us must continue to display imagination, resourcefulness, and ingenuity in our training and combat operations."

DISCUSSION

GENERAL WATERS: Colonel Cobb, first of all I want to express the gratitude of all of us to you and your panel for that fine presentation. Among the many things that impressed me was the leadership that stood out amongst the panelists who told us what they had done. I think this inspires confidence in all of us and it certainly shows that they have absorbed the spirit of Armor and Cavalry.

One thing that interests me about this war in Vietnam is what makes the enemy fight and stay there and die the way he does. Does he have a commissar somewhere along the line behind him; is he indoctrinated by a team; what is it that is causing him to stay there and be willing to die at a rate of 10 to 15 to one? I would like to have a comment on this from our younger officers.

COL COBB: Thank you very much, General Waters, on behalf of the panel. It has been a real pleasure for us to present this. Your question becomes very easy for me when you ask for comments from the younger officers. Captain Wolfe.

CPT WOLFE: Sir, I think that the answer is manifold. First I believe that many of the opponents we fight, the North Vietnamese and the VC, believe in what they are doing. This belief is fostered and encouraged by means of indoctrination. They have very good propaganda; their political officers are quite competent and they have succeeded in instilling in their men a degree of discipline which is normally equivalent to any

of our Army units in Vietnam. From the actions that I am aware of, and some I participated in, I would consider their tactics and their use of the resources available to them quite professional. I believe that the dedication they have shown to their cause plus their very strict discipline are the major reasons why they will stay and fight.

COL COBB: Bob, do you have a comment?

LTC NEVINS: I would certainly agree with Captain Wolfe. It's a matter of indoctrination I think and the key role the political officer plays in each company size and larger unit in the North Vietnamese Army. Another factor is that for political indoctrination the NVA at least are organized into three-man cells, with a cell leader. He helps maintain control of these individuals. So I think it is, again, indoctrination and political leadership at the company level exercised through the political officer. Oftentimes, he may be the strongest individual in the unit and he has the authority to override the tactical commander in some cases.

COL COBB: Tiger, do you have a comment?

LTC HOWELL: Sir, I would also say that they don't know what the hell is going on. I can remember in QUICK SILVER during which Colonel Farley commanded the regiment that we took a prisoner, brought him into the CP and he said, "Go on and kill me." I said, "We're not going to kill you." He was North Vietnamese, 3d Battalion of the 275th Regiment.

He said, "I know you are going to kill me." I said, "No, we want you to go back to your family up in North Vietnam," etc. Well, the next thing I knew he was interrogating me. He said, "What outfit are you from?" We said, "This is the 11th Cavalry," and he said, "This can't be the 11th Cavalry." I said, "What do you mean it can't be the 11th Cavalry?" He said, "We wiped you out." I said, "What do you mean?" He whips in his pocket and pulls out a newspaper. We got the interpreter in there and it said that on the night of 3 April, and I happened to be in base camp that night, the Blackhorse was hit by a thousand rounds of mortar fire, that we suffered over 2000 casualties and lost 200 ACAVs. And this he firmly believed. We took him outside and showed him the ACAVs—just those of the 1st Squadron—and I said, "Does it look like we've been wiped out?" He couldn't understand that, so I asked him again, "Do you still think that you've knocked us out?" He said, "Well, no, but we're going to do it with a BA40." And that BA40, the RPG2, is a real fine weapon. But I think they really don't know. This is not atypical with Asiatics. I think that you could go back to World War II and liken it to the Japanese. I think maybe it is a question of propaganda and thought control.

COL COBB: Any other comments by the panel? Any comments from the floor?

FROM THE FLOOR: Sir, Colonel Howell alluded to the warfare with the Japanese, etc., and I might mention

that in this connection there are numerous examples of fanatical NVA and VC, rather than being captured, blowing themselves up with a hand-grenade in front of you. This is very similar to World War II and shows this strong feeling and discipline.

GEN BURBA: The other side of the coin. I'm wondering what any of the panel's present assessment is of the South Vietnamese as fighting soldiers, of their organization for combat and training status and what the prospects are that in the future they might be expected to fight just as fanatically as the Viet Cong:

COL COBB: Sir, I'm sure most of the panel can comment on this. Tom, would you like to say a word?

LTC LYNCH: After going up to the Central Highlands from the Coastal Area, I had the occasion of going down and running a combined operation in the vicinity of Ban My Thout, for about a month. In my experience, both as a brigade executive officer and an infantry battalion commander, I found the Vietnamese small unit soldiers, NCOs and officers extremely responsive and capable of working with us and conducting good combat actions. In Ban My Thout I had the opportunity to work with an ARVN battalion, in a coordination and cooperation status. It worked very well and I was very much impressed with the regimental commander and battalion commander and members of the regimental staff. I think that it varies from unit to unit just as our own units in our own Army vary as to combat efficiency. I feel that with the proper weapons and with additional training the South Vietnamese units will be far superior to the NVA and VC in a period of time. When? I don't know, it will vary from unit to unit. These people are motivated by giving them M16 rifles, by congratulating them and by working with them as equals and not as superiors. I'm very much impressed with the South Vietnamese. Anytime they couldn't do what they were supposed to do it was as a result of a particular leader, not the individual soldier.

COL COBB: I think that you'll find that the other panel members' answers would be very much the same as Colonel Lynch's. I'll ask Colonel Howell to give another example.

LTC HOWELL: Sir, I've seen them and I've fought with them and they run to the sound of the guns—the little

fellows do. To go back again to Operation QUICK SILVER, and this was perhaps with an elite type of troops there—but even the other troops are good—a little ranger came in about three days after the fight and wandered into our artillery base which was about 10 kilometers from the scene of the fight. He was wounded with a sucking chest wound. He had his buddy, who almost had his leg shot off, on his shoulders and was carrying both weapons. Now you can't get much better than that. They fought well and when I got into the base camp where they had fought they were cheek by jaw with the VC and they had fought a tremendous fight in there. I agree that perhaps middle and higher leadership is sometimes lacking, but the individual is no different from the VC and in close combat I'd like to be with him.

COL CHRISTIAN: One problem that I'm sure all of us recognize, or most of us anyway, is the fact that we so often are able to find 'em and fix 'em but still in too many cases they can disengage at will. I'm just wondering what work is being done on this and what the latest experience with this problem has been in Vietnam.

COL COBB: I think that this is, and has been, the problem of many of the actions, not only the larger ones, but actions which were the result of a meeting engagement in which there was a short period of fighting before nightfall. In the illustrations that were given today of actions from squadron level down to platoon level, I think you saw, that in most cases, the friendly forces were able to effectively hem in or block the enemy's escape routes, and do a pretty good job of it. You did notice in the example given by Colonel Nevins that some elements were able to exfiltrate out to the north. This has been a continuing problem, many times the terrain and the inability to deliver troops into a blocking position permitted the enemy to escape. If it's an airmobile force, and sufficient ready reaction force is not available, you must gather your choppers and deliver your force in time to block effectively. But we must also remember that working as small three-man cell type units, the enemy are masters at infiltration. For a specific example I will call on LTC Nevins to describe the infiltration around the left flank of the northern unit which he alluded to, but did

not comment on in detail.

LTC NEVINS: In the action that I described I mentioned that the NVA did not succeed in getting out to the south. You will recall that there was a narrow sandspit with water on both sides and prior to darkness that evening I ordered Major Mike Crumley, who I think is in the audience, my Delta Troop commander who was in control of that part of the operation, to anchor his flank fire teams in the water because I suspected that they might try to get out using the water course. This was done in the south. The enemy were detected and stopped cold in the south. This was not done in the north and consequently the enemy got out.

I want to make a couple of comments about the three-man cell that Colonel Cobb referred to and to ask Colonel Jim Smith, in the audience, to make some comments on this. I've interrogated prisoners of war and the story that I got from all was basically the same. They say that the noise discipline and light discipline exercised by the American soldiers in some cases enables them to pinpoint the location of strong points. And of course, you can't put people on a cordon arm length to arm length. There are bound to be gaps even though they be only 10 or 15 meters wide. The enemy look for the noise and they look for the light made by the American troops. Then too they probe. They will send one man straight ahead 25 meters. If he picks up noise or if he sees the position is alert then he will move 15 meters right or left and probe again. Eventually they find a gap and they march a whole battalion out. I'd like to call on Colonel Jim Smith, if I could, for some additional comments along that line.

COL SMITH: My comments are based on having interrogated, while with the 1st Cavalry Division, about 100 NVA prisoners over a period of 15 months. I talked to a number of the reconnaissance personnel of the NVA regiments. After having discussed the detailed techniques they used I realized that no units, US or otherwise, are going to stop determined infiltrating or exfiltrating units using the tactics that Colonel Nevins has pointed out. The enemy three-man recon cell is probably the most basic element that they have and I don't think there are three well trained, highly motivated soldiers in any army who can't go anywhere that they want to go using the techniques



we teach. These people can do exactly what Colonel Nevins has pointed out. I know of at least 12 or 13 different occasions when in contact with NVA battalions we would take a 150 or 200 man chunk out of them but the remainder of the force would in fact exfiltrate during the night. These enemy recon men will tell you, that US soldiers smoke and US soldiers talk and when they locate them they can get around them. You can't cover every five meter space and if there is one depression in the soil through the line that you've got around them they'll lead their battalions out of there.

COL COBB: Thank you. Colonel Christian, your question may have also been pointed towards VC or NVA forces that just seem to vanish once large forces are committed. For example, when some of the large search and destroy operations get into an area and find very little enemy. I think this goes right back, on a larger scale, to our noise and light discipline and failure to use adequately proper deception methods. Our insistence in many cases upon large fire support bases and logistical installations being in place before a large operation is mounted has detracted from deception. You'll find that most of the infantry battalions prefer to operate within 105mm range. This has resulted in fire support bases being established in advance which can give away the larger operations. I always liked to think that this was one of the advantages of the cav, that it could go into areas without establishing advance fire support bases. The establishment of these and logistical bases can cause the enemy to vanish before you arrive. Are there any other comments from the panel?

MAJ SHRADER: I might add, sir, that I can think of several occasions where we did in fact find them—and finding them at times can become quite a problem. And then once the enemy was found, because of the way the initial contact developed, the commanders on the spot would underestimate the size of the unit they had made contact with. Consequently, units were piecemealed in. And as the situation developed they realized late in the day that the enemy was not just a platoon or two but a battalion. I think in a lot of cases the NVA can exfiltrate just because a large part of the area is not covered. Instead, all attention is focused on one particular spot. This

goes back to the old mission of the scouts, which is to find the flanks of the enemy. I think a lot of times the true flanks are not found until too late in the day.

CPT WOLFE: This is directed toward Colonel Cobb. Sir, do you feel that in your TOE in Vietnam you had adequate air cavalry or could you have used more air cavalry organic to the armored cavalry regiment?

COL COBB: I guess you never have enough of what you'd like. I might comment on this a minute and then ask Bill Farley, who was my successor, to comment. I was asked a number of times whether our organization was adequate. As you probably know, we went over with a modified TOE, which was approved before we left the states. When asked this question in the past, my answer was always that we made a good guess when we devised the MTOE. There were no real major changes that I would have requested.

The ACAV is a tremendous vehicle and enabled the type actions that were discussed here. These would have been impossible with other equipment in the present inventory. As you know, in the armored cav unit there were three men per M114, we changed it to five men per ACAV to allow one man per machinegun, one to drive the vehicle and one as a grenadier. We deleted the three tanks from the platoons and replaced them with two ACAVs because a light tank was not available. We kept the squadron tank companies which allowed us to cross-attach and place tanks with the cav troops. Tanks are very important on road operations, to lead against mines, for their armor protection and for their firepower with cannister and HE.

I think the cav troop is basically acceptable as it is. The greatest change that I would have recommended would be to have an additional tank platoon in each tank company. This would leave a tank company headquarters and a tank platoon after three platoons were attached out to the line companies. The tank company could then take some cav platoons from the other troops and function as a team.

With respect to the air cavalry, the 11th is a typical armored cav regiment with one air cavalry troop. Of course, it would be nice to go to the concept that has been talked about, an air cav troop per squadron. We were able, by reorganizing our own air cav troop and the squadron

aviation sections, to come up with 20 gunships. We could handle ourselves pretty well. And as a result, the regiment never used air support from outside resources except Chinooks in supply. I will now call on Colonel Farley because I know he has a little bit different idea on the organization than I do.

COL FARLEY: I guess you're never happy with what you inherit from your predecessor, but to address the question specifically, I think we have a danger in Vietnam of becoming perhaps overenamoured with mobility. I saw this in several of the infantry units where their techniques of search, I thought, were too fast. The VC and the NVA rapidly identified this deficiency to a point where I think they were able to cause us to miss many opportunities.

The cav regiment is designed for a purpose and to put more airlift in it would be defeating the purpose for which it's designed. We don't have the people in the first place to use more airlift. As Colonel Cobb pointed out and I agree, we had adequate gun support. We never felt a big need to bring in outside gunship support. What we had was perfectly adequate for our purposes. In order to increase that capability you would have to devote additional resources which I didn't think that we really needed to do.

On the tanks versus the ACAVs, as you all well recognize, the ACAV is a fine vehicle, but let's face it, it is an expedient. We took a vehicle designed as a carrier and converted it to a fighting vehicle. While it's serving its purpose well, I think there is perhaps room for improvement in the basic design of the vehicle we're using. It would be desirable to bring about a vehicle more specifically designed to serve our requirements in Vietnam.

The air cav troop performed well. It was a fine organization. I don't think many people in Vietnam quite realized the resources that we did have in that Air Cav troop. I think people often wondered why we were able to take care of ourselves so well. It's a tremendous organization. It's doing well over there, but there is definite room for improvement.

The question of tanks is a very complicated one. I would have preferred a tank with a 105mm howitzer. I think that this would have done much more to satisfy our needs over there than the main gun that we did have. Very seldom does one need the



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high velocity tank weapon in Vietnam. The howitzer would have given us a beehive round, would have given us a tremendous firepower capability, and it would have permitted the tank to maneuver a little bit more freely in the jungle where that overhanging 90mm gun tube sometimes is a problem.

We have a very serious problem with mines. Present mine detectors are unsatisfactory especially when you are dealing, as we are in Vietnam, with non-metallic mines. Consequently, in order to keep our speed of movement up it was necessary to use the tank as a mine detector, running it down the road in advance of the column. The tank is also a very fine jungle buster. We used it very successfully to get into areas where the light weight of the ACAV presented some problems.

I don't know whether this question of organization will ever be finally resolved. One commander may want more of one thing while another desires more of something else. But the cav regiment as it is in Vietnam today is very well suited for its job and only minor changes, I think, would be necessary in order to make improvements.

COLONEL COBB: Thank you, Bill. It just occurred to me that I don't think we've given any magnitude when we talk about losses due to mines. For example, in the JUNCTION CITY operation that was portrayed here the regiment attacked on three axes with two squadrons plus one mech infantry battalion, because I had one squadron back at base camp. In this action the regiment had 41 armored vehicles damaged by enemy action including 29 by mines. Now this does not mean destroyed. By Armor ingenuity and hard work many of the vehicles were back running the following day. Many had only one or two road wheels or a track broken.

MAJ SMITH: I would like to address this air cavalry question because I was in the position in the air cav troop of the 11th Cav of meeting people's demands in operations. I had to satisfy people like Colonel Howell, which was very difficult to do. I agree that we don't need any more lift in the regiment. We don't have the people to carry. And, we did have 19 gunships and were able to provide excellent fire support. However, we were unable to provide adequate scouting. Because all of the gunships were committed habitually with units that were moving on the ground, we

had very little scout and reconnaissance capability. I think this is the area in which the regiment needs augmentation. This is strictly from the man who was trying to dole out the assets.

COL COBB: Thank you Major Smith. I appreciate your additional comments. As a matter of information, for reconnaissance and command and control each squadron had four OH23Gs. Maybe with the new LOH, each squadron would have more of its own capability for recon and scout missions.

FROM THE FLOOR: This is a follow-up question for Colonel Cobb and Colonel Farley. Traditionally the vehicle of the armored cav unit has been a light tank. You mentioned the fact that we didn't have one. Would you comment on the role of the light tank as you see it?

COL COBB: Let me see if I have the question right. The role of the light tank if we had one? Well, I would say that the light tank, and the Sheridan assault vehicle might fill that role, within the armored cavalry troops would certainly be an asset. I think that there is a role for the light tank within the armored cavalry units. Now, we come to the other question and that is whether we should have light tank battalions. This is presently being studied, however, what their specific role will be I don't know. They could work well as separate tank battalions in Vietnam. In talking to people from the 9th Division which as you know, has the Riverine force in the Delta (where tanks cannot operate, but the 113 does very well), they speak very strongly for the need of a light tank and hope that the Sheridan would be able to fill this role as an amphibious vehicle and a light tank. As previously mentioned, the armored cavalry units in Vietnam have taken on an offensive role rather than strictly reconnaissance and security. Therefore, they can do many of the missions that a light tank battalion could because of the type of enemy and the lack of enemy armor. Are there any other comments?

CPT WOLFE: Sir, if I may make a comment here, thus far in the questions addressed there has been very little, if any, mention of the type cavalry unit in Vietnam which had the tanks at platoon level. This was true of the 3d Squadron, 5th Cavalry I was with in contrast to the 11th Cavalry Regiment which had tank companies in each squadron. Personally, having

been a platoon leader, I would much prefer to leave the tanks with the platoon. As was said earlier, this provides the platoon a much heavier volume of firepower. For example, in a battle like the one described at Bau Bang it's my feeling that if those tanks—even though we had only three at the time—if those tanks had not been present we could very well have been overrun. It's the added protection, the added firepower and the general maneuvering capabilities of the M48A3 tank, especially through a heavy jungle, which are so valuable. Perhaps a light tank would not be able to penetrate as well. There are many places in Vietnam where the very density of the growth itself prohibits the movement of tanks, as heavy and as powerful as they are. So, speaking from the small unit level, I would greatly prefer to have the tanks left with the platoons.

COL COBB: Thank you, Captain Wolfe. I think this is a matter of choice because, since we had tank companies, which a divisional armored cav squadron does not have, we habitually placed tanks with the cav platoons. There are two schools of thought on where within the regiment they should be, organic to cav platoons or in a company and habitually attached to cav troops. We ended up with the same thing as described by Captain Wolfe and in no case did we ever have a fire support base such as Captain Wolfe just mentioned that did not have tanks—for their firepower, for their searchlights and for their armor.

MR BLACK: I wonder if the enemy uses any type of armor.

COL COBB: To my knowledge, during my time in Vietnam and I think during the time of most of the panel, I think none was encountered. As you know, there were several reports of armor in the Khe San area. I understand that there were chassis found as our forces went back into parts of the area. These were reported to be the Soviet PT76, a light amphibious vehicle, and if you want to call it such, a tank. This to my knowledge is the only case of enemy armor. There have been several reports of enemy armor further down south, but to my knowledge they have not been verified.

Gentlemen, I think we have about used up the time that has been allotted for the discussion. Again, on behalf of the panel, may I thank you for your attention and your participation.

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AN ORIGINAL DRAWING BY SP4 ROGER A. BLUM FROM THE ARMY VIETNAM COMBAT ART COLLECTION OF THE OFFICE OF THE CHIEF OF MILITARY HISTORY, UNITED STATES ARMY.

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LETTERS TO THE EDITOR

AFSC History

Dear Sir:

Work has begun on an official history of the Armed Forces Staff College. Some of your readers can probably make significant contributions to the collection of the needed historical material. At this time, the official files at AFSC contain only a meager amount of background material, particularly with respect to the early years of the College.

We are appealing to active and retired people who were associated with either the initial plans for establishing the College or its early operation. We also are relying upon former students and staff and faculty who may have in their possession (or know the location of) interesting documents, letters, photographs or other items useful for the archives or for the history. Primarily, our interest is in two basic categories:

(1) How and when the idea for such a joint-service staff college began to form, who worked on it, and details of early problems and successes. Useful would be personal correspondence, memoranda, staff or committee records, conversations, etc. For instance, the College began operating in Norfolk in 1946, but there was an Army-Navy Staff College (ANSOL) in Washington for a brief period during World War II, and there is evidence that such a staff college was under serious consideration as early as 1942 or 1943. Needed are the details.

(2) Anecdotes or memorabilia to include material on personalities, unusual occurrences, curriculum, field trips, planning problems, and athletic or social events. Such information need not be pertinent solely to the early years of the College; it will be welcome regardless of the time it may cover.

Any assistance your readers may be able to provide would be greatly appreciated.

ALVIN D. WHITLEY
Director, Historical Research
Armed Forces Staff College
Norfolk, Virginia 23511

A Judge Judges Armor

Dear Sir:

Enclosed is my check for two more years of *ARMOR*.

My *ARMOR* was originally a gift from an Armor officer who believed that I had served in the 10th Armored Division in WW II. Actually, I was in the 8th Armored Division.

I find *ARMOR* most interesting, and read it from cover to cover. It is then shared with friends. I do not have time for a great deal of reading for pleasure. Your journal is an excellent way to catch some history in the making without investing excessive time.

With all best wishes for the continued success of *ARMOR*.

JOHN T. MURPHY
Judge of Probate

Petosky, Michigan

ARMOR strives to achieve multum in parvo. Your verdict rewards our labors. However, your obiter dictum that ARMOR is shared with friends reminds us inter alia that we always welcome new subscribers. Satis verborum. EDITOR

SMG For Armor

Dear Sir:

Captain Orr's article in the "Short, Over, Lost or Target" section of the March-April 1968 issue of *ARMOR* was a most valid article raising very

GREMLINS AGAIN!

The 79th Annual Meeting presentation "The Second Battle of Bau Bang" (page 13, *ARMOR*, July-August 1968) was given by Captain Hiram M. Wolfe, IV, 5th Battalion, 33d Armor, 194th Armored Brigade, Fort Knox. His by-line was on the final blue-line facsimile copy approved by *ARMOR*, but it disappeared somewhere in the printing plant. *ARMOR* and its printers regret this unintentional slight to one who gave a top-notch presentation.

important points. His recommendation of the issue of the Uzi submachinegun to armored troops is very wise. The Uzi not only is an extremely high quality gun, but it can fire antitank grenades with a reported capability of penetrating over seven inches of armor plate. This would seem to give needed defensive firepower to those repairing a disabled tank if they are attacked.

DANIEL LONDON

New Hyde Park, N.Y.

M4 History Wanted

Dear Sir:

I am preparing an historical study of the development and employment of the U. S. Army Medium Tank *M4*, the *Sherman*, and related vehicles from their origin before World War II up to the present. I am writing you in the hopes that some of your readers will be kind enough to give me accounts of their personal experiences with *Shermans* and related vehicles.

I am looking for first hand accounts describing the use of *Shermans*, tank destroyers on the *Sherman* chassis *Grant* and *Lee* tanks, *Priests* and self-propelled artillery on the *Sherman* chassis in World War II, the Korean War and other military actions including very recent ones. I want to get enough information to allow me to describe fairly good and bad points of the *Sherman* family vehicles in action. I also wish to give full credit to the officers, men and units who manned the machines and kept them in action.

I am also looking for information on unusual vehicles in the *Sherman* family, particularly those which were field modified. Information on things like extra armor added in the field and such modifications as the hedgerow plow would be most helpful. Photographs would be, of course, invaluable.

Any material your readers would care to contribute to my study will, I am sure, be both useful and interesting.

KONRAD F. SCHREIER, JR.

1400 Holmby Avenue
Los Angeles, Calif. 90024

M48A3 Record?

Dear Sir:

In our troop we have an *M48A3* tank that has probably broken the record for original equipment. Tank A26 has its original engine and transmission and is still in excellent overall condition after having run more than 5085 miles.

We understand that the current record is 5053 miles. Have we broken a record?

WILLIAM F. WILSON
Motor Sergeant

Troop A, 1st Squadron, 10th Cavalry
4th Infantry Division
APO San Francisco 96262

Another Member Found

Dear Sir:

Your two letters indicating that you had not received my new address have been received. Your interest is appreciated.

ARMOR had been coming to the squadron during my eight months of command. The articles were excellent and received considerable attention from the squadron officers.

I consider *ARMOR* one of our best spokesmen for Armor's accomplishments in Vietnam. Thus my interest in our publication is greater than ever. Keep up the excellent presentations.

GARLAND R. McSPADDEN
LTC, Armor

Headquarters USARV (G3)

The ARMOR staff does its best to keep track of members and subscribers. The arrival of change of address cards makes the task easier. Your kind comments indicate that we are keeping mission oriented at least in part. The articles that you and others in Vietnam are going to send in will allow us to continue to do so. EDITOR

On Cavalry in Vietnam

Dear Sir:

I hope it's not too late to comment on Colonel R. W. Farley's excellent "Blackhorse Report II" (*ARMOR*, Mar-Apr 68) and on the Annual Meeting Symposium discussion (*ARMOR*, Jul-Aug 68).

As one of a very small group of Armor types directly involved with selling the idea that the 11th Cavalry rather than a mechanized brigade or various other contenders should be sent to Vietnam, I have followed its exploits with more than ordinary interest. And

proud exploits they have been. The regiment has thoroughly justified its presence and done more than perhaps any other unit to put Armor on the map of Vietnam. I intend no derogation of this fine record when I point out the regiment has not yet developed its full potential.

The original highway security mission centered on Xuan Loc was intended to be merely a starter—an excuse, if you will, to get the regiment in country in sure hope that once its capabilities were seen other even more important tasks would be found. To a certain extent, of course, this has already happened, and the Blackhorse has participated nobly in numerous offensive operations in III Corps Tactical Zone. Nevertheless, Colonel Farley's report makes it quite clear that the regiment has gradually, and probably through no fault of its own, become tied to its fixed base camp and fallen into the habit of thinking of a particular "tactical area of interest." Indeed, but for the 2d Squadron's sojourn with the Americal Division, Blackhorse hasn't been out of the III CTZ.

In contrast, the early planners envisioned a mobile base which never stayed in the same place more than a few days. Even better would have been satelliting the regiment's base activities on some area or areas already reasonably secured for other purposes. In any event, we hoped (and I still hope) that over the months the regiment or its squadrons would appear in all four CTZs—reinforcing a key operation in the Delta, reacting to a threat on the Plateau, or conducting a spoiling sweep along the Coastal Plain—but always keeping the enemy off balance and insecure, wondering where they would turn up next.

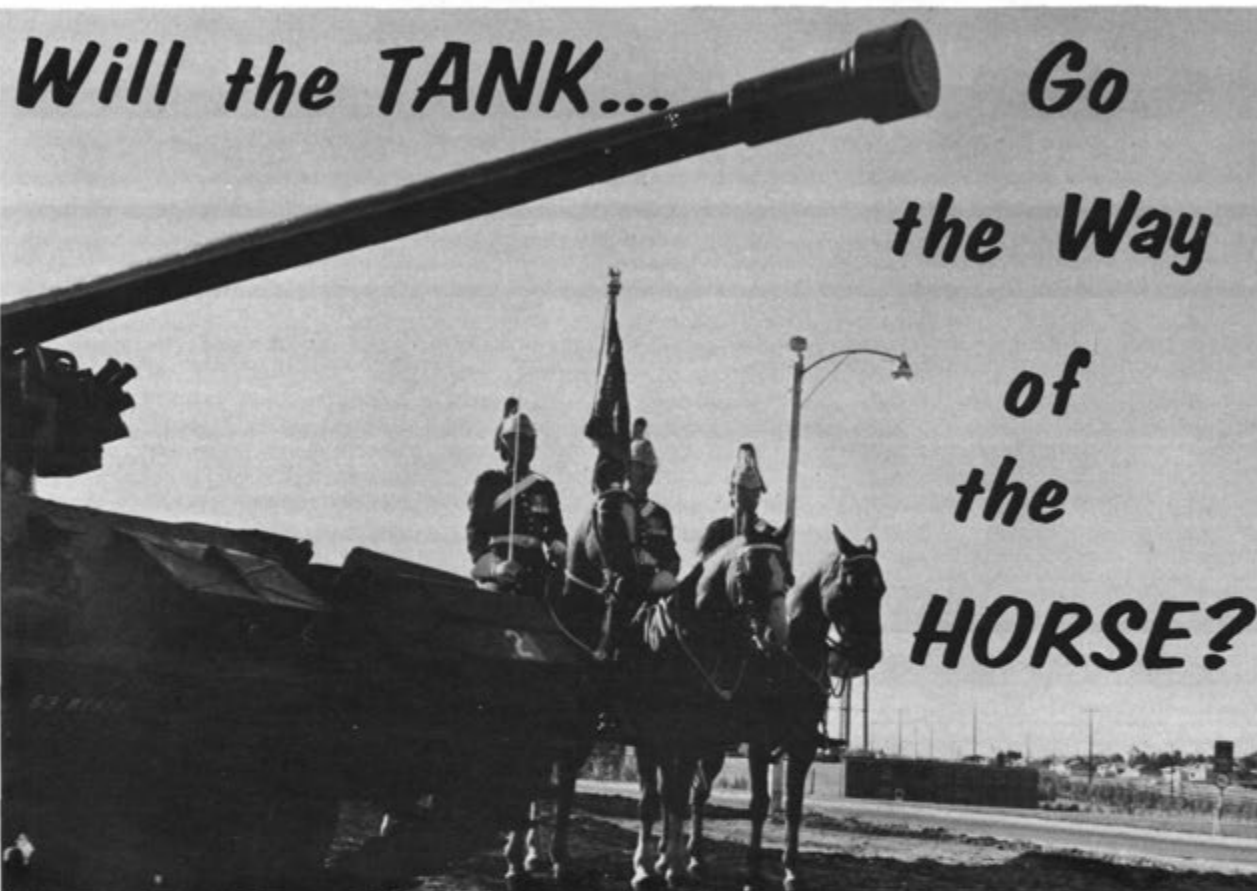
Perhaps we asked too much for a single organization. Certainly there is more than enough work to keep several more squadrons or even a couple of additional regiments busy. Even so, a comparison of Colonel Farley's map of operations on page 9 with General West's and Colonel Starry's "going" maps on page 25 of the same issue shows clearly that Blackhorse has a lot of room left in which to roam. I earnestly hope that they will be able to break the shackles of the base camp, overcome the constraints of Log Command's desire to deal only with the regiment and not the squadrons, and escape from the perfectly natural possessiveness of their next higher headquarters to scout new pastures farther afield.

But already the limited "tactical area of interest" is having its inevitable effect on thinking. The table of recommended organizational changes on page 7 reflects experience gained almost entirely in III CTZ. Its adoption would no doubt optimize operations in that familiar area, but what about other areas where either Blackhorse or some other Cavalry unit might operate? Specifically, I refer to the recommended restoration of medium tanks to the reconnaissance platoons.

At this point, I suppose I should admit that I was primarily responsible for taking the tanks and *M114s* out of the recon troops in the first place and replacing them with modified *M113s* (ACAVs). In doing so, I was guided by the experience of ARVN Armor and by country-wide terrain considerations. Refer once again to the "going" maps on pages 24 and 25 and note the large areas marked "No Go, Tk," particularly in the wet season. My thought was that most people seem to take more readily to receiving an attachment than to giving up an organic element. Moreover, higher headquarters are more likely to give a mission in an area where all of a unit's vehicles can go than in one where something must be left behind. A troop of pure ACAVs, therefore, can expect more varied employment than one containing organic tanks (unless, of course, the tanks are amphibious as is the *Sheridan*).

Let me emphasize that I have nothing against tanks. They are vastly more powerful than ACAVs and, where they are able to go, absolutely indispensable. The 11th's tank troops remained precisely because they were so valuable, but their presence throughout all elements tends to limit the entire organization to areas where they are able to go. In the interest, therefore, of the future flexibility not only of Blackhorse but also of other Cavalry units whose organizations will doubtless be patterned on theirs, I strongly suggest that if more tanks are needed—and they probably are—they be obtained by adding one or even two more platoons to the tank troops without weakening the ACAV strength of the recon troops. If personnel ceilings interfere, they can be met by cutting base camp. Surely a 6000 man base can take a 1% reduction (60 men or three tank platoons) and still support a 4112 man operating force. It might even become easier to move.

RAYMOND R. BATTREALL, JR.
LTC, Armor



by Major N. A. Shackleton, Lord Strathcona's Horse (Royal Canadians)

The unveiling of the *Main Battle Tank 70* last year precipitated a flurry of press speculation on the future of armor. At least one article presented the view that the *MBT 70* has achieved the ultimate in conventional tank evolution, and that advances in weapons technology would relegate the tank to a minor role on the battlefield of tomorrow. With this consideration in mind it is the intention to discuss the future employment of armored fighting vehicles in the light of current weapon developments—especially those weapons which are designed specifically for an antitank function and those which possess an antiarmor capability for their secondary role.

The Soviet Union and its satellites pose the most significant threat to the Free World. The armies of the Soviet Bloc, including armored forces, will, upon initial mobilization, substantially exceed those of the West. In the event of war armored forces in varying numbers can expect to be employed wherever the terrain permits. Large scale armored operations are feasible in Central and Eastern Europe and in many areas of the Middle East. Because of the preponderance of Soviet strength the western powers will be on the defensive at the beginning of hostilities. And, providing the West can prevail in this

phase of operations, the successful conclusion of a campaign can only be accomplished by going over to the offensive. It is in offensive operations, against a sophisticated modern army, that the vulnerability of the tank vis-à-vis the antitank weapon could have a critical influence on the outcome of a war.

How effective are modern antitank weapons? In considering this question it must be recognized that the foremost antitank weapon is probably another tank sited in the defense. The efficacy of tank gunfire in this role has been amply demonstrated at the annual NATO tank gunnery competitions in Germany. At these practices, the acquisition and engagement of a moving target, at 1100 meters—with three 105mm hits in nine seconds—has not been unusual. Furthermore, in the antitank role the *Main Battle Tank* is sufficiently well protected against shell and mortar bomb fragments to permit movement, with relative impunity, when it is not exposed to direct fire. This enables tanks in the defense to avoid smoke screening or to redeploy the weight of their defensive fire as the course of the battle requires.

Although the rates of fire and the accuracy which have been achieved by the Soviet armored forces

Photograph above contributed by the author. The escort and Regimental Guidon of Lord Strathcona's Horse (Royal Canadians) look out over the hull of a Centurion tank.

do not seem to have been made public, it must be accepted that their series of medium and heavy tanks will constitute a comparable threat when employed in the defense against assaulting Western armor.

BLOC ANTITANK WEAPONS

Unlike the West, which discarded much of its antitank artillery after World War II, the Soviet Union maintained and improved this element of its ground forces. The Soviets also developed self-propelled antitank artillery for use with airborne troops. The principal ground weapons are the 57mm, 85mm and 100mm antitank guns. All are towed pieces, but the 57mm and 85mm guns are fitted with auxiliary propulsion. When unhooked from the prime mover the gun can move under its own power, with crew and ammunition, to its fire position. The auxiliary engine facilitates movement into otherwise inaccessible positions and also permits rapid displacement when the gun has been located by the enemy.

Towed antitank guns possess certain noteworthy features. They are cheap, crews are easy to train, and they have a high rate of lethal fire (8 to 15 rounds per minute). Additionally, in defensive operations, because of their rubber tires and low silhouette, the identity of the equipment is easy to conceal. It is claimed that armor penetration of the 57mm, 85mm and the 100mm guns at 0 degrees is 5.5 inches at 500 yards, 5.1 inches at 1100 yards and 7.3 inches at 1000 yards respectively.

Three tracked versions of antitank guns may also be encountered. These are the *SU100*, the *ASU85* and the *ASU57*. The first is a self-propelled vehicle mounting a 100mm gun. Of late there has been speculation that this equipment will be superseded by one mounting a 122mm gun. The *ASU85* and the *ASU57* are lightly armored and designed for carriage by air. The gun characteristics are thought to be similar to their towed counterparts.

To this array of antitank artillery must be added the recoilless guns, rocket launchers and their progeny—the antitank guided missiles. The guns include the *B10* and the *B11*; their characteristics are similar to the United States 75mm and 106mm recoilless rifles. At the squad level we find the *RPG2*, an infantry shoulder-controlled launcher which fires an 82mm projectile 165 yards. Three Soviet antitank guided missiles (ATGM) have been identified: the *Snapper*, *Swatter* and *Sagger*. All have appeared mounted on vehicles and their ranges and perform-

ance are thought to be comparable to their NATO counterparts, about 400 to 3000 yards, with penetration of more than 15 inches of armor.

The effectiveness of the ATGM in battle has yet to be clearly established. The first generation of these missiles requires a certain degree of visual and manual coordination to guide the missile onto the target. In some instances the time of missile flight may be as high as 20 seconds. During this period the ATGM operator's efficiency may be degraded by gunfire, smoke, a sense of isolation and the stress of battle generally. The stress factor has been evident at formal demonstrations where a normally efficient ATGM operator has repeatedly missed his target because of the strain induced by the presence of visiting dignitaries. The battlefield potential of ATGM fire has been considered at some length in the Soviet Bloc military publications. In an article in *Polish Soldier*, it is claimed that, "... taking all factors into account . . . 40 percent of the tanks engaged would be destroyed."

WESTERN ANTITANK GUIDED MISSILES

In the West the first generation of ATGMs is gradually being superseded by new systems that rely to a lesser extent upon the manual dexterity of the operator. There is little unclassified data on Soviet developments in this field; nevertheless, it would be unwise to assume that they are not making similar progress. In the West the second generation of ATGMs includes the United States *TOW*, the French *SS12* and the two Franco-German missiles the *HOT* and the *MILAN*. These weapons, like their predecessors, are wire-guided. But, the inflight control of the missiles is effected by simply tracking the target through the operator's optical sight. One advantage of the new systems is speed. Some of the older missiles travelled at less than 200 mph. The *HOT*, on the other hand, is driven at 630 mph thereby reducing the time of flight by two thirds. This mitigates the operator stress factor, lessens the chance of detection and reduces the likelihood of evasive action by the target tank.

The 22 pound *MILAN*, with its range of 2100 yards, may be fired from the shoulder but the *TOW*, *HOT* and *SS12* are designed for helicopter, vehicle or ground mountings. Both the *TOW* and *SS12* missiles fall into the 160 pound weight category; and the *SS12* carries a warhead whose lethality against any tank is guaranteed by 63 pounds of high explosive.



MAJOR N. A. SHACKLETON is currently assigned to Headquarters, Canadian Forces Mobile Command. Commissioned from Sandhurst, England, he served with Canadian Armor in World War II. A graduate of the Canadian Army Staff College, he has held staff and troop duty appointments with the Royal Military College of Canada, the Canadian Joint Staff in London, the 4th Canadian Brigade in Germany and with the 56th Canadian Reconnaissance Squadron in Egypt. Other assignments have included the Directorate of Combat Development and the UN Armistice Commission in Jordan where he was serving during the Six Day War of June, 1967. Major Shackleton writes frequently for American and foreign military journals; he is a contributor to the recent book, *Military Texts*, published by the Oxford University Press, London. This is his first appearance in *ARMOR*.

SOVIET ANTITANK CAPABILITIES

Another factor that will influence the outcome of the armored battle is the dual, and in some instances, the triple capability of Soviet artillery. In the field branch the 85mm, 100mm, 122mm and 130mm guns all possess a significant antitank potential. The same applies to Soviet antiaircraft artillery. It is noteworthy that much of the ammunition and mechanical components of field, antiaircraft, antitank and self-propelled artillery and tank guns are interchangeable. In effect this gives Soviet formations deployed in the defense a series of antitank strong points in depth. These could diminish the scope for decisive breakthrough or encirclement aimed at disrupting the support areas of a defensive position.

The antitank threat may be summarized briefly by a review of the Soviet motor rifle division in the defense. In non-nuclear war it is estimated that a forward division will occupy an area with a frontage and depth up to nine and five miles respectively. In this 45 square miles may be found more than 700 antitank weapons including tanks. Theoretically this means that in each square mile of defended area, assaulting forces could encounter an average of some 15 weapons capable of penetrating armor at some range or another.

During World War II a German *Panzer*grenadier division, with less than half this antitank firepower, was able to inflict 50, 100 and even 150 tank casualties on assaulting Allied troops in the course of some of the battles in Normandy and North Africa.

THE SCENARIO CHANGES

However, the scenario of future operations in Europe will likely be different from that of 1944-45 when the Allies possessed overwhelming superiority in tanks, artillery and air power, and where, by and large, operations consisted of the capture of a suc-

cession of fixed defensive positions. These were usually attacked after a lengthy period of preparation and when the strength and location of the enemy defensive forces had been ascertained. With the radical changes in the Soviet Army over the past 20 years, certain of our World War II techniques, which are still current, will no longer be feasible.

Providing friendly forces are able to anticipate the intentions of the enemy on the outbreak of hostilities, and to establish well organized defensive or blocking positions at the right time and place, the power of the defense could severely curtail a Soviet offensive. But, because of the complete mechanization of Soviet ground forces, the initial confrontations will be characterized by movement at speed. And, as often will be the case, when time or circumstances do not permit the adoption of a strong defensive posture, friendly forces will be compelled to fight a series of meeting engagements—a battle of maneuver. These actions will be fought against columns of tanks closely intermixed with APCs, driving at speed, astride the autobahns or other suitable axes of advance. At these times the side possessing numerical superiority in armored vehicles and firepower together with the better system of command and control will dominate the field. Firepower in a battle of maneuver means tanks—and the disparity in relative tank strengths would give the enemy a decided advantage.

Furthermore, even if the enemy advance was contained and the situation stabilized, offensive operations against enemy held areas would be critically affected by the factor of enemy mobility and his capacity for speedy alteration of his deployments immediately before or during an attack. This capability for rapid movement combined with his antitank potential could reduce or nullify the value of the intelligence data upon which the attack plan,

against a fixed defense, is based. Quick changes in enemy troop dispositions could also lessen the efficacy of the indirect fire support plan. Furthermore, they could render the assaulting elements more vulnerable to mounted attack during the assault or before an organized defense is established on the captured objective. At such times the action could revert to an armored *melée*—the odds again being in favor of the stronger force.

From the foregoing it appears that, in areas of good tank going, there will be fewer occasions for the deliberate or set-piece attack against a clearly defined enemy disposed on clearly defined objectives. To the battle group (battalion task force) commander assembly areas, boundaries and lines of departure will be less meaningful. And there will be fewer occasions when the preparation and execution of detailed mortar and artillery indirect fire support plans will be possible. There could be still less opportunity for dismounting mechanized infantry and launching them into the assault on foot—because the targets and the objectives will be moving armor.

WHAT THE COMMANDER CAN DO

Essentially, the solution to the problem lies with instant, tank killing firepower in sufficient volume to prevail against armor in the mobile battle, against antitank weapons during the assault of the fixed defense, or, against a combination of both. At the present time it seems that this can only be achieved by direct fire weapons.

The main direct fire weapons available to the battle group (task force) commander are the guns of the supporting tanks. Ideally, the battle group (task force) is tailored with the correct ratio of tanks to infantry to meet the needs of a particular mission. In practice, however, it may be expected that many battle groups (task forces) will be infantry heavy due to the lack of tanks. The latter will comprise a relatively small proportion of the total vehicles when we take into account three or four companies of mechanized infantry APCs, a battery of artillery SP guns plus the engineers and other attachments.

Under the current tactical doctrine much of the non-tank element will play a relatively passive role in the type of operations envisaged, as they are unable to contribute significantly to the destruction of tanks or antitank weapons. Nevertheless, the firepower resources could be made available by certain changes in battlefield techniques and adaptations to equipment.

This will entail the exploitation of the fire capabilities of the supporting artillery. In a battalion size battle group (task force) this could be a battery of six 155mm SP howitzers. The current equipment, the *M 109*, is lightly armored. It possesses an all round traverse, and although its rate of fire is much less than that of the *Main Battle Tank*, the shattering effect of its 95 pound projectile to some extent compensates for this feature. SP artillery cannot be expected to perform a tank role on the battlefield, that is, to participate in the assault. The equipment is not designed for this function nor is the organization. But in a close, directly aimed fire support role, behind armor, the power of the fire they can deliver against antitank gun and ATGM detachments will do much to aid the advance of tanks and APCs.

Because of their light armor and the time necessary to get into action, SP guns employed in the direct fire role would be compelled to advance at least one tactical bound behind the leading armor. This would obviate the need for them to fight their way forward and would permit them to search for and to engage antitank weapons as positions are revealed when these weapons open fire against the assaulting armor. With the SP guns providing the "leg on the ground," or part of it, a larger proportion of the battle group's (task force's) tank element would be available to build up the shock-producing weight and momentum that characterizes the successful armor attack.

In the case of the assault against an organized defensive position, SP guns would continue their direct fire support role until the objective had been seized by the tanks and mechanized infantry at which time they could revert to their normal indirect fire support role. This procedure would also be adopted during a pause in the mobile battle and at night when the usual defensive fire tasks would be arranged to defeat dismounted attacks or infiltration.

Another source of direct firepower for the mobile battle is the mechanized infantry component of the battle group. Progress has already been made in this respect by the introduction of the 20mm gun and by design changes in APCs that enable troops to fire their personal weapons on the move. It seems however, that this process could be carried a step further by fitting a large proportion of APCs with a weapon that possesses the capacity for destroying armor and smashing antitank weapon positions. This weapon is, of course, the recoilless rifle with its antitank and HE plastic ammunition.

USE THE RECOILLESS RIFLE

The adoption of the recoilless rifle for this function would involve a weight penalty necessitating the loss of the heavy machinegun and possibly four passengers. But this would still leave a squad of six to eight men with a significant small arms fire potential for fighting on the move or dismounted.

The employment of the recoilless rifle on the APC presents certain problems resulting from backblast, limitations in traverse and fire control. But these are outweighed by several factors. A large number of engagements likely to occur in armored battle will be at ranges of 800 meters or less—well within the capabilities of the recoilless rifle. The confrontation of the enemy with a multiplicity of tank destructive fire and HE projectiles will contribute disproportionately to the shock effect and the disorganization of his antitank defenses. Another important factor is that possession of the recoilless rifle in quantity would reduce the probability of APC casualties through flanking engagements and chance encounters. This hazard was vividly demonstrated by an action involving a mechanized infantry unit in Normandy in 1944 described by Chester Wilmot in his book *The Struggle For Europe*: “. . . the company halted its half tracks along the edge of a tree lined road . . . out of the woods . . . lumbered a Tiger tank . . . which proceeded down the line . . . within a matter of minutes the road was an inferno with 25 armoured vehicles blazing—all the victims of this one lone Tiger”.

The adoption of the recoilless rifle and SP gun expedients would lead to certain changes in the tactical handling of the battle group (task force). Tanks, with their superior sighting equipment and gunpower, would continue their vital function of engaging enemy armor and especially moving targets. But in the advance to contact, or in the assault, the frontage of the tank element and the density of the leading columns would be thickened up by APCs mounting recoilless rifles. These vehicles would move in immediate proximity to the leading tank echelons. Their tasks would be to take out the short range antitank weapons, deliver speculative fire against likely antitank positions and engage any other targets appearing within effective range.

With good command and control, the combined results of simultaneous fire by tanks, recoilless rifles and SP guns would heighten the shock impact on the enemy and serve to hasten the progress of the

attacking force during the last critical 1000 meters of the assault onto the objective. Against a mobile enemy the fire of certain of the mounted recoilless rifles and SP guns could strengthen the integrity of an advancing column by sealing off the flanks against counter-thrusts or encirclement. During a temporary reverse, or a halt in operations, these weapons could serve in an equally important role by helping to convert the battle group into a tank-proof enclave.

CONFRONT THE ENEMY WITH MOBILE ABUNDANT FIREPOWER

In discussing the subject of the armored attack Sir Basil Liddell Hart in *Defence of the West* advocates the employment in tanks in swarms. He says: “. . . It is the principle of saturation—of confronting the defence with many more separate assailants than he can cope with”. He supports his theory by the example of Guderian's victory at Sedan in 1940 which was achieved by the concentration of 900 tanks on a front of less than five miles. Allied concentrations on this scale seem unlikely in the future due to lack of tanks. But confrontation of the enemy by mobile firepower, in quantity, can achieve much the same effect in localized engagements at the task force level.

It must be emphasized however, there is no question of substituting APCs or SP guns for tanks; it is a matter of increasing the effective utilization of the fire of these components of the battle group in support of tanks to counter or nullify the expansion of the antitank threat. The tank remains the kingpin of the armored battle. The task of the mechanized infantry in the tank-infantry team remains the same—destruction of the shorter range antitank weapons while closing with and destroying the enemy—in cooperation with tanks. The tasks of the artillery are also unchanged except that, by the timeliness and accuracy of its fire in the direct role, whereby it can apply HE, smoke and HE with variable time fuzed ammunition as required, it will accelerate exploitation of the tank's mobility and firepower.

Finally, in reply to the question posed in the title of this paper—the answer is NO. During the foreseeable future the *Main Battle Tank* will be the best means of moving and fighting in an environment of high velocity metallic debris extending from 7.62mm bullets to 16 inch mortar fragments. And the tank's response to any type of ground target will continue to be the quickest and most accurate available. What we really need is more of them.



Hot Pursuit

by Captain James R. Ellis

1st Place



ARMOR OFFICER ADVANCED COURSE
NUMBER 2

The Vietnam War and its many aspects have been the source of great debate throughout our country and even within the American military profession itself. The use of tear gas, napalm, and defoliation agents; the M16 rifle; the destruction of Viet Cong dominated villages and relocation of their inhabitants and the bombing of North Vietnam have all had widespread support and also opposition. These subjects together with many of the tactical techniques currently in use have been extensively debated by both active and retired military people.

The battles at Loc Ninh, Dak To and Bu Dop focused attention on an aspect that has caused almost as great a stir as the bombing of North Vietnam. This is the concept of "Hot Pursuit."

Those who have experienced the emotion of a battlefield encounter will agree that a commander's appeal to take any steps necessary for his own troops' protection will find many sympathetic ears. So too, the idea of "Hot Pursuit" holds a certain emotional appeal for me.

While I was a company commander in the 1st Infantry Division during Operation JUNCTION CITY (February-April 1967), my company conducted op-

erations in War Zone C within a half-mile of the Cambodian border. Casualties, both killed and wounded, were inflicted by Viet Cong troops who used the border as a shield. At a time like that it is relatively easy for a commander to believe that "Hot Pursuit" is not only justified, but is necessary to revenge the tragedy caused by an evil enemy.

The inherent danger in the idea of "Hot Pursuit" is its strong emotional appeal. Should it take hold among the American people, it could pressure our strategy makers to decide in its favor. For several reasons I believe that this would be a disastrous decision.

The immediate problem faced by a commander if "Hot Pursuit" is authorized is where to stop. The closeness of the Cambodian border, and the significance of this international line were ever present in our minds as we planned and conducted operations nearby. The border and what it represented was respected, like it or not, in even the most difficult situations. The problem then is what possible line on a map or on the ground would have the same or greater significance and could finally be agreed upon as the place to halt?

Political and military definitions of the term *pursuit* need to be clearly defined and agreed upon by all concerned. Pursuit, as defined and taught by the Armor School, is an offensive action which necessitates maintaining contact with the withdrawing enemy. Using this definition, and in the absence of some other constraints, it follows that as long as contact with a retreating enemy is maintained, continued pursuit would be justified. Likewise, once contact is broken, the commander would be compelled to return to South Vietnam even if he were approaching a known enemy camp or supply base.

It is common practice to pursue an enemy force within Vietnam with either Air Force or Army aircraft and artillery fire. The question arises: Must a ground unit maintain contact to justify continued

pursuit? Or, can continued pursuit be justified by air observers maintaining the requisite contact?

The use of Cambodian air space by tactical aircraft would cause grave international problems, and would create a dangerous situation for any civilians in the area. However, since no prudent commander would require his ground forces to pursue without the assurance of air and artillery support if needed, air pursuit beyond the Cambodian border would become a necessary and natural part of the entire "Hot Pursuit" idea. Thus, in another case, international political reactions would become of secondary importance to the objective of achieving a local military success.

Of course, the enemy may decide to stand and fight as he approaches his base area. This might well engage the pursuing forces in a major battle within Cambodia itself. And it might even require the movement of reinforcements into the area, the establishment of artillery fire support bases on Cambodian territory, and the establishment and security of lines of communication and supply into the battle area.

The political problems resulting from an escalated action of the type hypothesized above would more than eliminate any short range tactical military advantage achieved. To preclude such escalation, there must be very strict control measures imposed on forces in position to conduct "Hot Pursuit." These control measures would so tie the local commander's hands as to be almost as unwelcome as the current situation.

Another objection to "Hot Pursuit" is doubt as to its potential effectiveness in solving the problem. We know from our experience in South Vietnam that the Viet Cong (VC) and North Vietnamese Army (NVA) forces are capable of shifting supply bases and lines of communication in a relatively short time. To move deeper into Cambodia would be difficult, but not impossible, for them and we would again be faced with the original problem of where to stop in our pursuit. Where do we draw the final line?

Another doubt is raised by the realization that the enemy has been and will continue to be successful in infiltrating his troops and supplies across the border. He often moves deep into South Vietnam before launching an attack and then successfully breaks contact long before he nears the border, if indeed he withdraws that way. In other words, "Hot Pursuit" could only apply to those actions that take place close enough to the border to enable

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allied troops to maintain contact as the enemy withdraws into Cambodia.

Even now after our many military victories and our increase in forces, the enemy still retains the initiative to a marked degree, especially in border areas. Generally "Hot Pursuit" would take place on a relatively narrow front instead of along the entire length of the border. Therefore, the enemy could divert our attention in one area and while we were pursuing, he could increase his infiltration elsewhere.

One possible solution that has been widely discussed is the "sanitization" of a strip of land within Cambodia along the border. This implies the creation of a DMZ type area. To make this effective, the Cambodian government would have to agree to the removal of the civilian population from the area to preclude their injury and their exploitation by either side. The people relocated from this area would create tremendous problems for the Cambodian government and would doubtless necessitate some financial assistance from an outside source.

Another problem is the question of how wide the strip must be. It certainly would have to be deep enough to preclude medium range artillery and rockets from firing across the neutralized area into South Vietnam. With this as a basic criterion, a strip some ten to twelve miles wide would be required.

The immediate problem to the military is how to insure that this area remains sanitized. Satisfactory policing and control of the strip could only be expected to result from the physical presence of, and active patrolling by, United States troops. It seems safe to assume that Cambodia would never agree to the occupation of this area by the South Vietnamese. Once the physical presence of United States troops became an established fact, we would be faced with the same problem of providing for their security from attacks by enemy troops operating from base areas deeper within Cambodian territory. In fact, we would have to run the full circle, and would again be faced with the question of "Hot Pursuit."

War breeds on war, and escalation on escalation. It seems certain that if any of Cambodia is brought into the active war, then very soon all of Cambodia will be involved.

The problems involved with the Laotian border are similar and need not be restated here.

Another compelling reason for opposing the application of the doctrine of "Hot Pursuit" is the reaction that would result with respect to the DMZ between North and South Vietnam. The problems

associated with the Cambodian border—where to stop, will it work, sanitization—would all be present with "Hot Pursuit" being permitted along the DMZ. However, the greatest complication is that "Hot Pursuit" across the DMZ would constitute an invasion of North Vietnam. The awesome consequences that might result from this action can only be guessed at, even by the most astute of our foreign policy makers. China might feel compelled to react, and we could become embroiled in the most devastating land war the continent of Asia has ever known.

Yet another objection, on a lesser plane, is that "Hot Pursuit" could cause lengthy and large scale operations within Cambodia, Laos, or North Vietnam. These would require the diversion of materiel and personnel from the support of the various pacification programs now underway. Our leaders, military and civilian, are generally agreed that the achievement of our stated aims in South Vietnam depends in large measure on the success of these programs. Thus, if "Hot Pursuit" were to be employed, what might become a series of short-range allied military victories along or across the borders would certainly assist the Viet Cong in their efforts to achieve long-range success among the South Vietnamese people.

We took up the fight in Vietnam recognizing certain recognized limitations and restrictions. The agitation for removal of these restrictions is great. However, as long as political objectives are to prevail over military objectives, we cannot justify a violation of the international boundaries. To allow the enemy continued use of his sanctuary behind the border is often a bitter pill to swallow. But swallow it we must unless we are prepared to undertake a far more ambitious military endeavor than is currently advocated by even the loudest "hawk."

I believe the best recourse we have with regard to the problem of the enemy gaining sanctuary beyond international boundaries which we respect is to go to the United Nations. The International Control Commission is not effective. We must, if possible, cause the United Nations to take positive action to stop Communist violation of the borders.

If, however, the United Nations proves either unwilling or unable to take satisfactory steps, then we must be prepared to continue our operations within the present framework until a suitable settlement of the hostilities is achieved.

In any event, we must not succumb to the tempting but treacherous profferings of the idea of "Hot Pursuit."

2nd Place

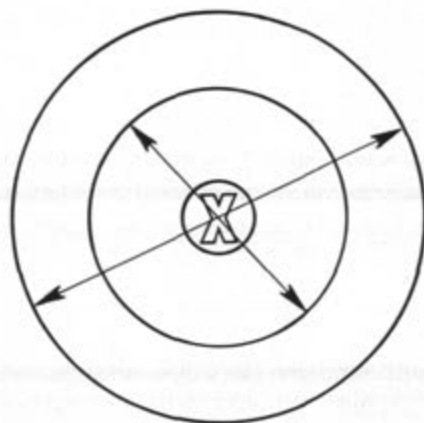


ARMOR OFFICER ADVANCED COURSE
NUMBER 2

INSTALLATION SECURITY

IN A

NO FRONT WAR



by Captain Raymond S. Creek

To say that a stability operation is both comparatively new and very difficult is to understate the situation. Not only have the concepts of war changed, but the methods of supply, administration and transportation have had to change to keep pace. No longer are there large, secure supply complexes to the rear. No longer are there areas where whole units are given a few days of rest, safe from the majority of the enemy weapons. But most significant of all, no longer is there a rear area characterized by the

security to carry on the day-to-day activities of the military forces.

This loss of area security is one of the major problems confronting the commander today in Vietnam. How can he secure major logistics and administrative installations? How can he secure major airfields and storage complexes? How can he insure that he will have tomorrow what will be needed tomorrow?

The first consideration is the type and size installation to be secured. Generally, installations in the forward area category, of necessity, cannot be secured to the same extent as the more complex major type. Thus base camps differ from Da Nang, Cam Ranh Bay, Long Binh and Tan Son Nhut. Second, the commander must decide how much manpower and other resources he can commit to base security operations. Third, a decision must be made as to how far to extend security, taking into consideration the weapons being employed in the area and its relative security.

In this article consideration will be given to installation security methods presently used in Vietnam

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Vietnamese and American firemen fight fires started by a mortar and rocket attack on Tan Son Nhut Air Base.

since that theater is the best example today of stability operations and the no-front war.

The Viet Cong has attempted to surround Saigon, the capital city, with three concentric rings to control access and limit movement in and out. For our purposes, let us turn this idea inside out and put ourselves on the inside trying to keep others out. Imagine a standard bullseye target with the smallest circle being the X-ring. The installation to be secured occupies the same position and importance as the X-ring in the target. The ten and nine rings describe areas approximately five and ten kilometers respectively from the perimeter of the installation.

The X-ring or the installation itself probably has the most difficult security task in stability situations. The entire area within this perimeter, rather than only selected sensitive parts of it, must be secured. If indigenous personnel are employed, the task is even more difficult because of the sabotage threat. It is an obvious fact that infiltrators cannot be distinguished from trusted personnel in this environment.

In Vietnam, it has been found that the most reliable method of defeating potential infiltrators and

saboteurs is the often-preached axiom, *Do not establish a pattern*. This is best done by varying the number of personnel at entrances to the area, changing the times the entrances will be open, alternating entrances to be opened, changing guards at varying hours, and modifying methods of screening and searching entering personnel and vehicles. There are innumerable methods available to vary entrance conditions and the methods of personnel screening. Of course, if no indigenous personnel are employed, the problem is reduced immeasurably.

Once inside the installation, security can depend on the manpower the commander wishes to commit. Effective measures for sensitive areas include good chain link fence and exclusion of indigenous personnel to include janitorial and repair workers. Very effective are sentry dog teams, employed on a changing time schedule, but used primarily during periods of limited visibility. Foot patrols, outposts and good fencing backed by lights and minefields are effective barriers to unauthorized entry.

The question might be asked why these elaborate internal defenses when successful penetrations are so few? Yes, they are few but there were at least

three in the Saigon area alone in one year. Under the cover of diversionary attacks, in December 1966 Tan Son Nhut was penetrated, in May 1967 Bien Hoa Air Base was penetrated and in the fall of 1966 the ammunition dump at Long Binh was sabotaged. That there were not more can be attributed to the intensively organized security measures.

With respect to external security, the ten ring, which is the closest to the potential enemy targets, is the most important. Although lately much has been made of the attacks on Da Nang and Bien Hoa by 140mm and 122mm rockets, the preponderance of Viet Cong attacks are by mortars. The usual weapons used, because of their mobility, are the 60mm and 81 or 82mm mortars. These weapons, with their maximum ranges of about 2000 and 5500 meters respectively, are extremely destructive when properly employed. One round from either weapon, hitting an ammunition pile or aircraft, is usually sufficient to render the target useless or cause it to explode and generate further destruction.

In the inner five-kilometer ring, saturation patrolling and ambushing are essential. Only by extensive use of these, primarily at night, can the area around an installation be considered relatively safe. The security force committed in this area should and must have only one mission—securing the area. At no time should this force be removed from the area or be committed to an operation that will last beyond nightfall. Attacks against major installations during the hours of daylight are most infrequent, thus the emphasis on night operations. However, short daylight search operations should be undertaken from time to time. If it is necessary to bring in other units to accomplish this, these should be requested.

The outer, or nine, ring, is another matter. Although it is important in the security plans of the installation, it need not be so saturated with friendly effort as the ten ring. For instance, the outer areas around Saigon are frequently occupied by troops that have been in heavy contact in other parts of the country. Usually, these units can man the areas and find time for rest and resupply as well. The important thing is to keep the enemy on the defensive in this area, keep him moving and keep him out. The nine ring is also the likeliest area for rocket sites of the type used against Bien Hoa and Da Nang. The element of time is against the enemy here since rockets are more difficult to set up than mortar tubes.

Essential to this pattern of security are several elements: coordination, aerial observation, communications, on-call fire power and a highly mobile reaction force.

The security area must have only one man responsible for security and one headquarters to which reports are rendered. Ideally, this should be on the installation being secured for the best coordination. Internal security of the installation must be coordinated from this one center to permit the most rapid dissemination of information and a fully coordinated effort to repel all attempted attacks or penetrations. This center must know the location of all friendly patrols, ambushes and possible landing zones, must schedule harassing and interdiction fires and must direct the entire security effort of the installation.

Aerial observation is almost a necessity with the less saturated outer belt and the possibility of rocket attack. This can be particularly effective during the hours just preceding darkness. This is the time when movement can, and often does, start. Frequent observation of the area from the air will increase the chance of noticing anything that may have changed on the ground. Along with aerial observation provision should be made to have helicopter gunships and flare ships on the alert to reinforce ground troops in the area.

On-call fire power has been used successfully in Vietnam to repel actual attacks and to suppress diversionary attacks. Thought should be given to the use of counter-mortar radar in connection with the indirect fires on call. The counter-mortar radar has proved to be an effective weapon for this type situation. Indirect fire weapons together with counter-mortar radars manned by well-trained crews are essential to a solid all-around defense.

Intelligence is the very key to good security. Immediate reaction to intelligence, regardless of its seeming insignificance, is essential. Many attacks have been thwarted because of rapid response to a bit of intelligence.

A no-front war is a rather new, or at least recently revived, concept to United States forces. Just because this places a commander in an unfamiliar situation there is no reason for security to become an insurmountable problem. The three ring or target concept discussed is one method presently being used in Vietnam. Its effectiveness depends on the resources committed and the intensity with which it is pursued. The idea alone is not the answer to all security problems.

by Lieutenant Colonel

Thomas G. Woods



A TRUE MOBILE DEFENSE

Although the mobile defense has become a recognized tactical concept, a paradox exists in that the history of US military actions during and since World War II is not replete with examples of the successful conduct of this type of operation. This situation is due, in large measure, to the fact that our forces were principally on the offensive at the height of our military strength and experience in World War II. Additionally, Korea did not offer ideal conditions for the employment of this form of defense.

However, the German Army, based on experience, geographical conditions, and necessity, employed this form of defense frequently, and with considerable success against unfavorable odds. What might be considered an example of a true mobile defense surrounds the exploits of the 11th Panzer Division, part of the German 48th Panzer Corps, during December 1942. This particular engagement, which was part of the overall panorama of the Battle for Stalingrad, is referred to as the Chir River Battle.

LIEUTENANT COLONEL THOMAS G. WOODS, Armor, entered the service as an enlisted man in 1943. He served in the South Pacific and was then discharged as an officer in 1946. After earning his BS from the University of Chicago in 1949, he returned to the service. He received an RA commission in 1952. Subsequently he has served in the 1st and 2d Armored Divisions, the 3d Infantry Division, as an instructor in tactics at the Armor School and with Headquarters, II Field Force in Vietnam. He is now a branch chief in Combat Developments Command Headquarters.

THE COMMANDER

In recognition of the importance of the human factor in battle, particularly leadership and tactical skill, a few remarks about the 11th Panzer Division's commander are in order. Major General Hermann Balck, the recently appointed division commander, arrived on the scene of the pending engagement only shortly before the start of the battle, assuming command of a unit that was in less than desirable circumstances of rest and tactical posture.

Beginning with his command of the 1st Rifle Regiment, 1st Panzer Division, in the assault crossing of the Meuse in France in May 1940, and continuing with Panzer Regiment 3 against the British Commonwealth Force in Greece in 1941, General Balck had demonstrated his ability as an aggressive and highly competent armor commander. We shall see that his leadership and understanding of the offensive use of armor—this time in the mobile defense—were again demonstrated in the command of the 11th Panzer Division.

THE SITUATION

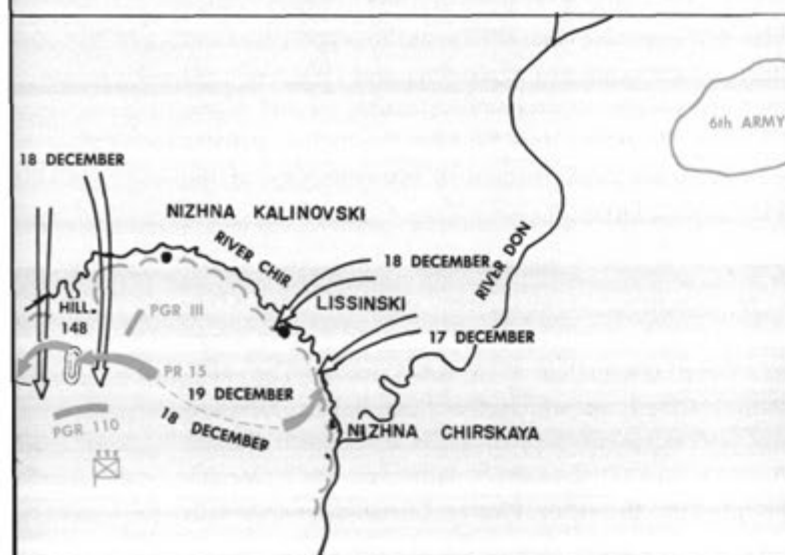
In December of 1942, the Sixth German Army was besieged at Stalingrad. The Fourth Panzer Army had been designated as a relief force. The 48th Panzer Corps, of which the 11th Panzer Division was a component, was to assist the Fourth Panzer Army in this relief mission. However, on 7 December, before the 11th Panzer Division joined with the Fourth Panzer Army, the Russian First Armor Corps attacked across the Chir River, penetrating



MAP 1—December 7 through 11.



MAP 2—December 11, 12 and 13.



MAP 3—December 17 through 20.

to State Farm 79 and spoiling the plans of the German command. The dispositions of the 48th Panzer Corps at this time were as shown on Map 1—the First Luftwaffe Division, an elite infantry division, on the Corps left flank; and the 336th Infantry Division, a division of somewhat less renown, on the right flank. The corps commander, on the advice of General Balck, held the 11th Panzer Division in corps reserve.

The commander of the 336th Infantry Division, whose command post was nearly co-located with General Balck's, asked the Panzer Division commander to make a frontal attack to relieve the serious situation in his sector. Balck, however, decided to deal with the situation in a different manner. The Russian attack would be held from the southwest by the 110th Panzergrenadier Regiment, while engineers and antiaircraft artillery units would hold to the west. The decisive blow was to come from the northwest and be delivered by the 15th Panzer Regiment which would hit the enemy rear at dawn on the 8th. At the end of the day the Russian First Tank Corps had been thrown east of the Chir River, minus 53 of its tanks. During the three succeeding days, 9 through 11 December, the Panzer Division was employed to reduce penetrations in both the 336th and 1st Luftwaffe Division areas.

On the evening of the 11th, Balck received information on two new major penetrations in the Corps sector, one at Lissinski, and another, over 22 kilometers away, west of Nizhna Kalinovski (Map 2).

The corps commander allowed General Balck wide latitude in dealing with these Russian threats. Retaining his forces in mass, General Balck, after a night march on 11-12 December, first attacked the flanks of the Russian threat at Lissinski at dawn on the 12th and eliminated it. Next, he moved his forces northwest the same day and compressed the Russian threat west of Nizhna Kalinovski to a considerable extent. However, another dawn attack on the 13th by the 11th Panzer was only partly successful in that a strong Russian counterattack was able to retain a small bridgehead south of the Chir River. Throughout this series of engagements the corps commander had used his two infantry divisions as a shield and pivot, behind which the mobility of the 11th Panzer Division was committed to deal with the serious threats aimed into the corps sector.

By this time, the 11th Panzer Division had been

moving by night and fighting by day for approximately eight days and needed rest. However, this was not forthcoming. Forthwith, the Russians initiated a general offensive along the Don-Volga front. For the second time, the German corp commander was faced with two major threats in his area—north of Nizhna Chirskaya on the 17th and west of Nizhna Kalinovski on the 18th (Map 3).

The 11th Panzer Division was again committed, and on the 18th, reduced the threat at Nizhna Chirskaya, although it did not throw the Russians completely across the river. A night march on 18-19 December placed the division in a position to execute an attack at 0500 on 19 December west of Nizhna Kalinovski.

By this time the principal fighting force that remained in the 11th Panzer Division was Panzer Regiment 15, down to about 25 tanks, Panzer Group III, and Panzergrenadier Regiment 110, a predominantly infantry force which was performing a blocking role. However, by using stealth and covered routes, the Panzer Regiment 15 commander, under General Balck's guidance, was able to destroy two Russian columns successively, eliminating approximately 65 Russian tanks that morning without losing a single tank of his own. Stiff fighting also ensued later on the 19th and again on the 20th.

By 21 December, the corps commander thought that he would be able to give 11th Panzer Division a chance to rest and reorganize. However, on the German north flank the Italian Army had allowed a breakthrough and the entire German front was threatened. Therefore, as a final act, the 11th Panzer Division was forced to march approximately 100 kilometers west to the city of Rostov to establish blocking positions at this vital communications center, allowing Army Group Caucasus to make an orderly withdrawal and not be drawn into the maelstrom of Stalingrad.

THE PARTICIPANTS COMMENT

A succinct commentary on the 11th Panzer Division's role in this battle is set forth by Major General F. W. von Mellenthin on page 183 of his book, *Panzer Battles* (University of Oklahoma Press, 1956.) General von Mellenthin was, at the time of the actions described, Chief of Staff of the 48th Panzer Corps.

"Throughout the fighting [11th Panzer Division] had acted as a 'fire brigade,' moving behind the two infantry divisions to quell one dangerous conflagration after another. When the infantry found

it impossible to deal with the larger Russian bridgeheads, Balck came tearing down on the enemy with the whole weight of his armor in accordance with the old maxim: No stinting, but stunning . . . Balck never left a single tank in direct support of infantry, as this was regarded . . . a waste of much needed armor."

Von Mellenthin goes on to cite General Balck's comments, "For weeks on end the division moved by night, and before dawn was at the very spot where the enemy was weakest, waiting to attack him an hour before he was ready to move. Such tactics called for unheard-of efforts, but saved lives, as the attack proper cost very few casualties, thanks to the Russians having been taken completely by surprise. The axiom of the division was, 'night marches are lifesavers.' It is true, however, that the question of when the men of the 11th Panzer got any sleep was never clearly answered."

THE LESSONS

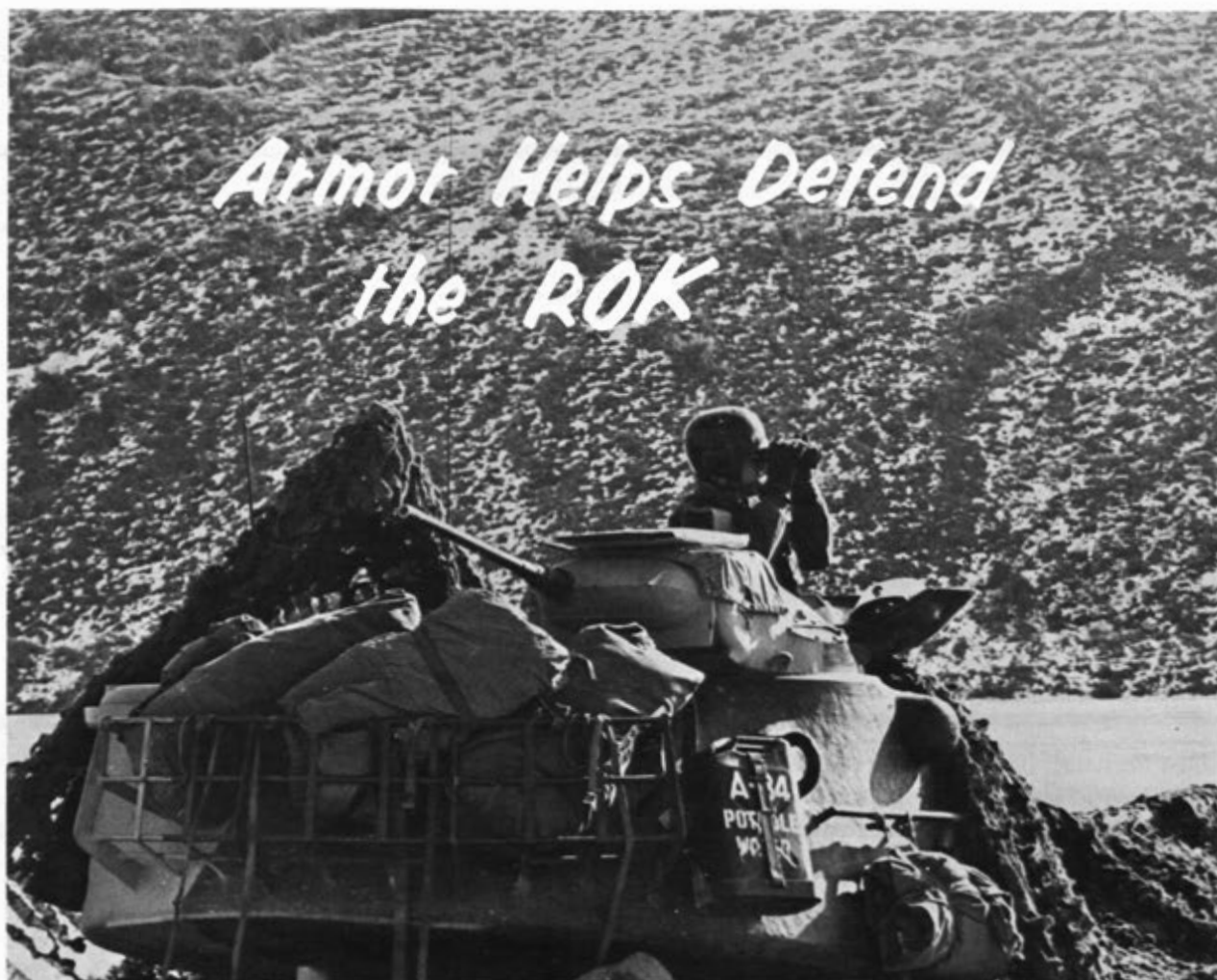
The description of the events of the battle properly evokes professional admiration for the unit and its commander. However, we would be remiss, as students of our profession, not to extract from this prime historical example of a mobile defense those lessons applicable to present and future defensive tactics.

► The mobility of armor is exploited in the mobile defense to maneuver firepower into effective killing ranges. The mere presence of armor on the battlefield is a potential threat to an attacker. But, its full potential is not realized until armor is maneuvered rapidly into position to employ its assorted weapons of selective lethality.

► The mobility of armor, as characterized by its full-tracked cross-country maneuverability is capitalized upon to achieve surprise and to mass combat power. Application of these two principles of war causes the commander conducting the mobile defense to hit the enemy at a relatively unexpected time and place.

► The characteristics of armor permit the rapid concentration and prompt dispersal of combat power needed to deal with critical situations, and create an optimum chance of survival on the modern battlefield.

► The acquired skill and physical and mental conditioning necessary to execute successful night marches and subsequent pre-dawn attacks are absolutely essential to the successful conduct of the mobile defense.



Armor Helps Defend the ROK

by Robert F. Norton

The North Korean seizure of the U. S. Navy ship "Pueblo" and the abortive assassination attempt on Republic of Korea President Chung Hee Park in January once again has focused world attention on the troubled Korean peninsula.

Unlike Vietnam, Korea has a static front. This is formed by the 151-mile long Demilitarized Zone (DMZ) established with the signing of the Armistice Agreement in 1953. No peace treaty has yet been accorded the divided nation; merely an armistice that is frequently breached by the aggression of the North. The presence of the combat troops of the United Nations Command (UNC)—American,

Korean and Thai—is as necessary today as it was during the war of over a thousand days fought more than 15 years ago.

The United States contingent to the UNC, some 50,000 strong, has long known the hostile nature of North Korea. Stationed from Pusan to the DMZ, the infantrymen, artillerymen, tankers and support troops of the Eighth United States Army have seen fellow soldiers wounded and killed along the DMZ.

Thirty-five American soldiers have been killed and 105 wounded as a direct result of North Korean aggression since the signing of the truce in July 1953. Most of these casualties have resulted since North Korea started its deliberate campaign of provocations against the ROK and the UNC in October 1966. There have been seven American soldiers killed and 24 wounded in 1968 alone.

Two American Infantry Divisions, the 2d and the 7th, with their organic Armor and artillery sup-

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Korea—"Land of the Morning Calm." Tanks of the 73d Armor, 7th Infantry Division pursue an aggressor element on an Army Training Test.

port, currently stand shoulder to shoulder with their ROK counterparts in defense of the northern portion of the Republic.

Providing the Armor muscle for the 2d US Infantry Division in its 18-mile sector of the DMZ are the 1st and 2d Battalions of the 72d Armor, the "Crusaders," and the 4th Squadron of the 7th Cavalry.

The 4th, part of the famed Garry Owen Regiment, then organized and equipped as infantry, spearheaded the breakout from the Pusan perimeter during the Korean War and linked up with amphibious forces that had landed at Inchon.

Following the Korean War, the 7th Cavalry was reorganized into five separate squadrons. Three are now in Vietnam and one is in Germany. Only the 4th Squadron remains in Korea, guarding the vital Kaesong Corridor—historic invasion route into the south—and providing the armor for daily patrols of the front line sector defended by the 2d Infantry Division.

The eyes and ears of the 2d Division, the 4th is the forward-most US Army Armor element in the Republic of Korea. Its Quick Reaction Force (QRF) can respond to a call for help south of the DMZ in a matter of minutes.

The two battalions of the 72d Armor are deployed throughout the 2d Division's sector, up to the south bank of the Imjin, in support of the infantry troops.

The 72d Armor, then designated the 72d Tank Battalion, fought with the "Indianhead" division in such famous Korean War battles as the Punchbowl, Old Baldy and Heartbreak Ridge. It returned to Korea with the Division in 1965, when the 2d replaced the 1st Cavalry Division.

The Recon Platoon of the 1st Battalion, 72d Armor, acting as a QRF, killed three North Korean

infiltrators in its area less than a year ago. One of the NCOs was awarded the Army Commendation Medal with V device for his heroic action in that incident.

The 7th Infantry Division, to the east of the 2d, is provided its armor maneuver, firepower and shock effect by the 1st Battalion of the 73d Armor—the "Bunker Busters." The division's ready force, the 2d Squadron of the 10th Cavalry, provides up-front support for the 7th.

The 73d landed at Inchon in 1950 and helped liberate Seoul following two weeks of the most intensive combat in its history. Later in the war it landed in Hungnam, North Korea, and set up a perimeter of steel through which the remnants of the 7th Division and the 1st Marine Division withdrew from the hordes of Chinese as the "New War" engulfed the battered Korean peninsula.

The missions of these Armor units are not unconventional. They are charged with destroying enemy armor, adding strength to the attack and counterattack of infantry, and assisting in exploiting successes of the attack. In Korea, the fixed line of the Demilitarized Zone gives them a special mission of providing highly mobile defensive strength against North Korean infiltration attempts.

These five Armor units must remain in a state of constant alert and continual combat-readiness in the face of reported planned aggression from the north. Intelligence estimates of enemy intentions stress the need for further readiness in the face of the increased sabotage, infiltration and terrorism expected from the north this summer and fall.

The Korean winter offers excellent terrain for Armor maneuver. In the summer, however, with its swampy rice paddies and monsoon-lashed roads, the Korean landscape is a real challenge to a tank.

Tracked vehicles are usually bound to the roads during the wet summers of Korea's monsoon period. The paddy fields are flooded and the numerous stream beds that are used for tank travel during dry periods are bank full. Nonetheless, as in Vietnam, the men of Armor respond to the challenges. Through determination and ingenuity they get through.

The amount of heads-up combat-readiness displayed by American Armor in the ROK is the product of many hours of intensive training, much of it tailored to local conditions.

Tank crews periodically move to the divisions' gunnery ranges for semi-annual gunnery proficiency tests which measure the crews' ability to engage a variety of stationary and moving targets. Tests conducted both in daylight and darkness, give crews a time limit in which to identify the target, determine its range, open fire and destroy it.

A three-day course is used to increase the ability of drivers and acquaint them with terrain conditions peculiar to Korea.

Armor units also participate in Operational Readiness Tests and Field Training Exercises (FTX) from company through corps-level to further develop their ability to perform in varying tactical situations. These constant FTXs emphasize camouflage in the frequently barren Korean terrain. In the winter vehicles are whitewashed, while during the rest of the year vehicles are painted in alternate strokes of earth colors, olive drab, and black.

American Armor units in Korea have also trained Republic of Vietnam Armor NCOs in modern techniques. A number of twelve-week courses featuring battalion parts room supply procedures, quarterly servicing and recovery have been conducted.

There are two tanks in Korea that are not combat ready. They have no crews. They have seen their moments of war, and are now merely reminders of the past.

The "Iron King" of Easy Queen Mountain in the 2d Division area is an enigma to experienced tankers. Easy Queen is a steep, treeless peak rising nearly 1500 feet above the division area. Its grades frequently surpass the 60 percent that a tank normally can negotiate. Yet, near its very top sits the rusted hulk of a tank left from the Korean war. From its condition, other than serious rusting, it is apparent that the "Iron King"—an M46 Patton—was never hit by enemy fire. Its turret, surprisingly, can still be rotated. How it got to its lofty perch and why it was abandoned is unknown.

Another Korean War vintage tank—an M26—

rests on the parade field at Eighth Army headquarters. Parked with its cannon facing north, old 1016359 serves as a memorial to all the UNC tanks which fought in the Korean War. It symbolizes the Armor strength, of yesterday and today, defending the Republic of Korea. The multi-nation UNC Honor Guard passes in review before it today during ceremonies. And its members maintains the now-engineless hull and its guns in high state of polish. The tank is one of the most popular photography subjects in the Seoul area.

The ROK Army, defending the central and eastern portions of the DMZ, has recently formed two new armored brigades. Under the command of brigadier generals and equipped with M48 tanks, the brigades will strengthen the ROK front immeasurably. Formerly the ROK Army had separate tank battalions assigned to its field organizations. These battalions were equipped with M47 and a few M48 tanks.

Across the desolate DMZ, the North Korean Army, according to estimates of the Institute of Strategic Studies in London, has furnished its 18 infantry divisions with approximately 500 Soviet-made tanks of the T34 and T54 types and approximately 450 additional armored vehicles. All North Korean armored equipment of any importance comes from the Soviet Union, and it is generally employed in support of infantry. Currently, assault gun armor battalions are organic to each North Korean Infantry Division.

When the North Korean Army invaded the South in June 1950, it crushed the lightly armored ROK defenders and roared beyond Seoul without being seriously challenged. On 5 July near Osan, some 35 miles south of Seoul, 540 Americans of Task Force Smith—an advanced element of the Japan-based US 24th Infantry Division—awaited them. It was to be the first engagement for American troops in the Korean War.

Leading the aggressor column were 33 Soviet-made T34 tanks. Task Force Smith met this Armor with only crew-served weapons and a small number of 75mm antitank rifles. Although employed gallantly, this firepower was not enough. The American force lacked the armor to repel armor and Task Force Smith ultimately was forced to withdraw.

The Armor that was not there in June and early July 1950 is present in force in the ROK today. The armored might of the American and South Korean forces is a strong deterrent to a renewal of hostilities on the Korean peninsula.

90MM GUN

AN ADDITIONAL TRUMP FOR THE

AMX 13

Translated from TAM by SSG James E. Klett, ARMOR Staff



In recent years important progress has taken place in the construction of tanks: armor plate, silhouette and mobility have been improved. As a result, in 1964, it became apparent that the *AMX13*, weighing 13 metric tons (13½ English tons), and its 75mm gun had lost some of its effectiveness. The capability of defeating an opponent had declined and it was necessary to improve the armament of this light tank. But how?

The main problem was the choice of a projectile. It is as true for the cavalryman as it is for the ar-

tilleryman that the arm is not the gun but the projectile. The projectile used in the 75mm gun was a full-caliber, heat-treated steel shot that was capable of penetrating at 1000 meters 170 millimeters of armor at angles of less than 90 degrees. Muzzle velocity was 1000 meters per second. Its combat range (that is, the maximum distance for which the gunner is not compelled to make a correction in range) was 1100 meters.

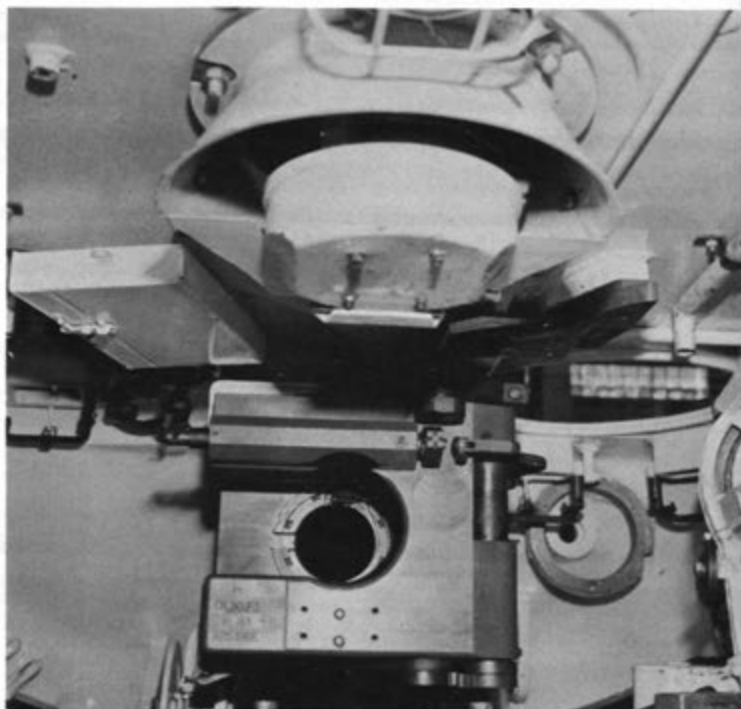
The first essential was the improvement of the penetration power of the projectile. This was the

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reason why a discarding sabot 75mm projectile—which would have permitted modernization at the smallest cost—was not retained. The improvement in armor penetration was not sufficient compared to that of the shaped charge round toward which attention was now turned.

The performance of the non-rotating 105mm shaped charge projectile was excellent. It could penetrate armor 350mm thick at angles less than 90 degrees at *any* range to which it can travel. On the other hand, it presented two problems. First, it is heavy. Therefore its muzzle velocity can be no higher than 800 meters per second which allows a combat range of only 900 meters. Secondly, the operational cost was high, both from the point of view of vehicle alteration—a new gun had to be built and the turret modified—and from the point of view of procurement.

The fin-stabilized 90mm shaped charge projectile is a compromise between performance and cost. Its penetrating power is inferior to that of the 105mm; 320mm versus 350mm under the same conditions. However, the older 75mm round is twice as heavy as the new 90mm, thus the 90mm can achieve the same muzzle velocity with two times less drop in trajectory. Adopting the 90mm permitted, on one hand, the retention of a good combat range, and, on the other, the use of the same gun tubes. It is necessary only to rebore the gun to a 90mm diameter. Moreover, the cost of procuring ammunition is reduced because the round is already standard for

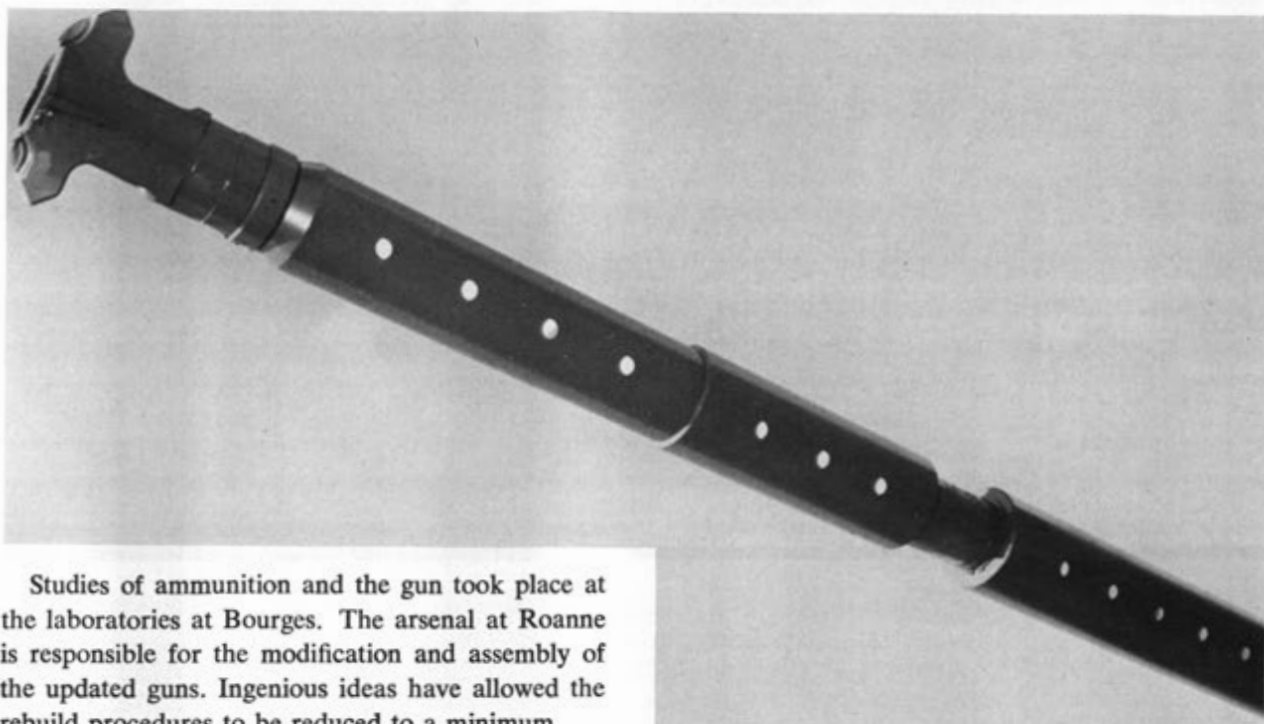


Inside the turret of the AMX 13

the Panhard *AML* armored car and the refitted Panhard *EBR* armored car. (See "Panhard Armored Cars" *ARMOR*, Nov-Dec, 67). Finally, accuracy of the 90mm is excellent. Shot-group dispersion on the target is small, thanks to fin-stabilization. At 1000 meters the shot pattern does not exceed the limits of one square meter. Together, these decisive advantages explain why the army general staff and the military engineers selected the 90mm.



The AMX 13 Tank



Studies of ammunition and the gun took place at the laboratories at Bourges. The arsenal at Roanne is responsible for the modification and assembly of the updated guns. Ingenious ideas have allowed the rebuild procedures to be reduced to a minimum.

The shape of the cartridge base and cartridge length are unchanged. Thus it has not been necessary to change the breech mechanism. Modifications have had to be made only on ready racks for the ammunition. The number of rounds carried remains the same. The methods of traverse and elevation are unchanged. The improvement of the *AMX13* has not complicated its employment and the crew readily adjusts to firing the new ammunition.

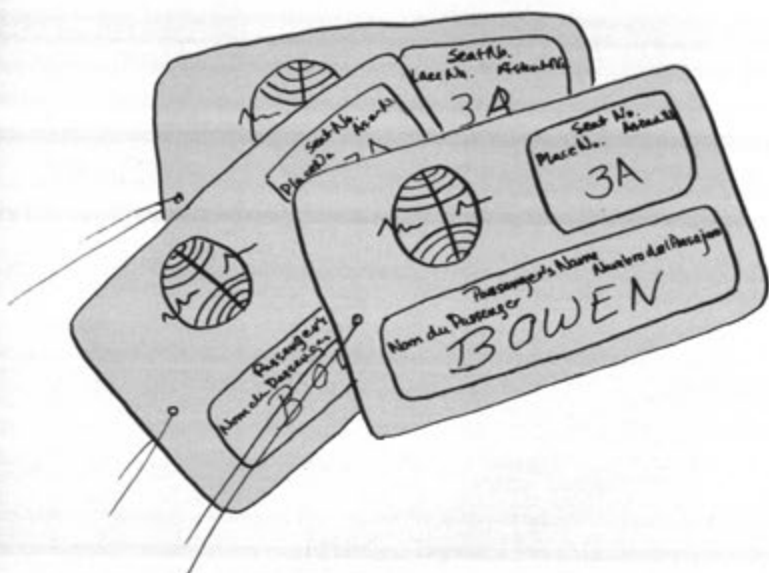
Profiting by its passage through the workshops, the *AMX13* has been given additional improvements. The reconditioned tanks have been made ready to receive infrared equipment for the conduct of night fire.

A gun tube thermal shield called a *machon anti-arcure* or antidroop jacket also has been adopted. Usually the difference between the internal and external temperature of the gun tube, which results from atmospheric changes, causes a sway or warp in the gun tube. This deformation may lead to unacceptable range errors. The gun tube jacket prevents this deformation by bringing the internal tube temperature to the ambient outside temperature through the circulation of air around the gun. This results in improving accuracy by 0.5 mil at 1000 meters.

Thus, the military engineers at Bourges and Roanne have adopted simple and effective solutions. Their success is remarkable. They have retained the lightness and mobility of the *AMX13* and improved its effectiveness, transforming it into a formidable tank.

The 90mm gun tube within the *machon antiarcure* or thermal shield. The *machon antiarcure* prevents sway or droop in the gun tube, thereby averting range errors due to atmospheric changes. (Below) View from the turret of the *AMX 13*.





TAGGED!

by Betty Windsor Bowen

Our kitchen had so invariably been the background for our husband's startling announcements of a new set of orders, that we no longer burned the stew. One day in June of 1963 this usual pattern was broken and this was an omen of out-of-the-ordinary happenings for our family. Even our Tanker was surprised!

He was leaving shortly for Vietnam, and we were not! He and I were both sitting on the new front steps watching the movers unload our household goods onto the lawn, and watching the postman work his way around our antique sofa to deliver our first batch of mail. As there was an official letter from his commander-to-be, he tore it open and read, "In addition, after your arrival you will want to consider carefully the possibility of having your family join you in Vietnam."

Several months and a ream of official DD forms later, the youngsters and I were rewarded with our own orders to Southeast Asia. Soon we were excitedly fastening our seat belts as our jet circled for a landing at Tan Son Nhut Airport, Saigon, Vietnam. Our Advising Trooper waited below.

We had read every piece of literature we could find about this special part of Asia (including Marco Polo and Rudyard Kipling), but nothing quite prepared us for our first shocking step into the East. Our initial introduction was to Asian traffic! In this undisciplined, writhing, wriggling, darting, beeping, buzzing, belching mass we met all of the differences of the East in one fell swoop — head-on, bumper-to-bumper, and from all sides.

Our Giant Trooper, 13-year-old Jan, 6-year-old Tommy, ourself, and our mound of luggage were stuffed into a battered, trunkless, blue and yellow mini taxi of forgotten vintage. We were hurtled onto a dusty, narrow treelined road the likes of which our Western eyes had never seen! From all directions came not just cars and taxis, but top-heavy buses overflowing with people and produce, even ducks and geese. We veered away from creaking carts drawn by people, by ponies or by water buffaloes. We dodged listing, humpback trucks and pedicabs and motorcyclo cabs. We squeezed through hordes of drag-racing bikes and motorbikes. We honked our way around jeeps and tanks. At the edge of the road we barely missed people bobbling along shouldering pole baskets or pushing vendor carts of hot soups, rice and noodles.

When our mini-taxi bumped and slid to a stop at 189 Vo Tanh, Phu Nhuan, Saigon, home looked good—even from behind the usual high wall bristling with barbed wire. We were met graciously at the door by our people, a cook and two boyesses (maids), who were shoeless and traditionally suited in white. In size our adult people were somewhere in between our six- and our thirteen-year-olds.

After we consulted horoscopes and compared our Christian and their Buddhist calendars, we were able to go about our endless business of caring for the family and the house in a language of fractured Vietnamese, French, and not nearly enough English. Together we must do all of the services we had so easily taken for granted back home: the

laundry; the dry cleaning of uniforms; the preparation of foods from scratch since much of the canned, packaged and frozen foods had reached the limit of endurance upon arrival; the disinfection of vegetables; and the eternal boiling of water. To change the boiling water into ice cubes took the better part of 24 hours and, with one plunk, they were gone.

Our remarkable cook (she could flip pancakes with chopsticks) explained that it was perfectly all right to eliminate the bacteria, the mildew, the mosquitoes, the flies, and the ants in the house, but that we must not harm the little insect-eating Gekos (lizards). The only good houses to live in were those with Gekos!

As we searched the night time sky above our roof patio for the familiar big dipper, now in a lop-sided position in the Eastern sky, the odor of incense reached us from the courtyard below. Our anamist and Buddhist people were paying their nightly tribute of incense, flowers and food to their ancestors. Sometimes distant flashes crossed the sky, and the thump and quiver of artillery fire could be barely heard and felt. We wondered just when we would learn to feel at ease on this unfamiliar side of the world.

In place of the absent television, our children used to sit in the shade of the bus shelter and watch the fascinating, never ending, ever changing panorama of Vietnam. Although they saw all of the evidences of a modern-day Vietnam, they also saw Vietnamese men and women dig trenches with tiny shovels, woven bamboo scoops, and reed rakes. They saw others erect giant telephone poles into standing position by the tug-of-war method. They saw heavy pieces of equipment, moved by the process of throwing metal pipes under the equipment, a refinement of the manner we had always associated with the building of pyramids.

Further down our street was a typical Vietnamese business district with rows of stall-like, open fronted, one room stores and repair shops. We saw people sitting inside on the ground weaving baskets with their hands, while holding and turning the baskets with their feet. We saw others saw boards, while holding the boards between their toes. We watched women build charcoal fires along the side of the street to cook their meal-in-a-pot, and then hunker down with the family to eat along the curb.

We detoured around people napping on mats along the sidewalks, or groups excitedly playing a game of numbered wooden pieces on tables only a

few inches high. We dodged swarming bands of children flying kites, while toting their young brothers or sisters. We passed amulet-holding patients intently listening to "healers" crying mystic chants and beating cymbals. Many greeted us with a happy smile and a wave, and some wanted to touch our blonde children as this was believed to bring extremely good fortune—especially for one expecting a child.

Our own small yard was a particular fascination on the days our gardener arrived. He hunkered down to cut the grass and snipped it with pruning shears. When it came to pruning the shrubs, he used only a long stick with a hooked nail at the top. He kept the wisteria, the palms and the banana trees neat and orderly with quick jabs from his wonderful stick.

Frequently, our Vietnamese friends came by to call, or their children came over to play with ours. One afternoon we heard our 6-year-old settle a loud argument with a presentation on what rules were and, further, how you had to play by the rules! We felt even a 6-year-old had a contribution to make.

A young Vietnamese girl, just out of her teens, invited us to visit the free evening school she had started several years ago for some 100 children of the street. These children could not afford to go to any school, and had to take care of their brothers and sisters while their parents worked. Only two other teenaged girls helped with the school.

We wondered how young and untrained girls knew how to go about formally teaching. Our friend explained, "Because these children know nothing, we must first play outside around the fire. Then



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we teach manners. Without manners you can learn nothing, for how do you know when to be quiet so you can hear? When the children can listen, we teach them how to wash and how to cook to be healthy. Then we teach them to read, write and count." The children weren't the only ones who learned from our young friend.

It happened that later that evening we went with our Trooper to the Caravelle Hotel for dinner. A correspondent with our group said, "Just show me even one Vietnamese who is willing to help another!" Not that day, or any other day, did he accept our invitation.

A newcomer never found it easy to get around Saigon, even armed with a map, and in a Vietnamese taxi. The streets just didn't match the map and the wrong inflection to your given destination could send you miles off course without your knowing it. The language barrier was particularly impenetrable in a taxi.

Shortly after our arrival, we had a fearful argument with a cab driver in downtown Saigon. Although we used different languages, the message was perfectly clear to us both. Our son was obviously ill, and the driver did not want to drive us to our house but rather to a Vietnamese doctor. When we finally ended up at our gate, the driver announced that he wasn't leaving "until Madame did something about her sick son!" Once we found where the American hospital was, we gave the address to the waiting driver. Satisfied, he raced us to Tran Hung Dao Street—and refused to accept a single piaster of either fare!

Our teenaged daughter and her friends found Saigon "cool, neat, fascinating and exciting." In remarkably good humor after Viet Cong terrorist attacks at the baseball park, movie and swimming pool, the teens requested "hazardous duty allowances," "junior purple hearts," and proudly proclaimed "where else could you go to school with soldiers all over the roof." There was also a remarkably serious side to these young people. They organized a summer camp, taught English, visited orphanages and hospitals, and helped with programs at the Hoi Viet My (Vietnamese-American Association). To do something about an undeveloped country was to be really in!

Toward the end of the long dry season, our people foretold of dire happenings, as these were known as "bad days." When there was an epidemic of cholera, it was met not with surprise but fear. Both we and our people were, however, surprised to find that unknown Vietnamese were ringing our gate bell and saying that "Americans have a way of cleaning and doing something to the water and food that keeps them from getting cholera. Would the Americans who lived in this house, tell them how?" We were "honored" to do so.

Our 6-year-old greeted the arrival of the rains with greater ecstasy than most, for this meant his birthday was soon to come. We had invited an elephant—on loan from the zoo—to come to our house and give the children rides. Before the elephant lumbered off with his trainer, he had treated all the adults in the neighborhood as well.

After an afternoon of marketing, we returned

to an empty home—unheard of, because a house was never left alone. In a few minutes our cook hurried through the gate crying that our 10-year-old dog was gone. Chances were infinitesimal that our dog would ever be returned and, yet, within several hours, a young Vietnamese soldier carefully returned our forlorn terrier. He refused his promised reward (the equivalent of a month and a half's pay). In the Vietnamese way said, "Madame's husband brings joy to my heart because he is here to help me and my family and Vietnam. If I can bring joy to the American officer's heart, and to the heart of his family, that is enough for me." And once we had wondered about feeling at ease in this land!

One Sunday will always be etched in our thoughts. This was a scheduled day of duty for our Trooper, so we loaded our family into our Renault and headed downtown to the Chapel. As we turned off Cong Ly onto Hong Thap Tu, we noticed a few more jeeps than usual. By the time we had counted the vehicles around the square, we knew something was amiss. When we saw trucks the entire length of Tu Do Street unloading camouflage suited soldiers with combat weapons, we knew it was a coup.

As we turned homeward, other civilians along the route came to the same decision. Shutters banged shut at the shops along the streets. People jumped on their bikes to spread the word as they too hurried home. We actually watched the news of the coup travel by word of mouth across the city, and only beat the news to our area by a few minutes.

With our transistor radio tuned on for news, we watched from our balcony as soldiers appeared down the street. The commander stationed a radio jeep under one of the banana trees in front of our wall. Because soldiers had nested a machinegun next door on the roof, our Navy neighbors decided to withdraw to our house.

When tanks thundered down Vo Tanh, it was the first time we had not cheered as Armor went by. The tanks deployed up and down our street, controlling entry. Just when we thought there might be cause for concern, the soldiers jumped down from their tanks to eat and rest in the shade. When darkness came planes dropped flares in the sky to illuminate the Vietnamese Joint Chiefs' Compound across the street and the area surrounding it. The coupling soldiers cut palm leaves to camouflage their tanks from the planes diving overhead.

The next morning, as the coup was still going on, there was no school for the children. They met these

coup days with the same exuberance as snow days back in the States. Around noon the tanks moved out, and this time we cheered!

After life settled down to normal an advisor friend of our Trooper's, who wanted to adopt a child, asked us to go with him to an orphanage. He advised us it would take a stout heart to see what we would see—total and complete poverty! We have never been the same since. With profound relief, we found that there were those who were effectively erasing the poverty—and of their own individual volition and during their own off-duty, non-military hours—the hospital corpsmen, nurses, secretaries, doctors, officers, and soldiers.

There was a group, when even haters of women's groups respected for their five figure financial aid and valuable guidance to hospitals, schools, organization and individuals. The hallowed Library of Congress even wrote to the American Women's Association of Saigon for their information booklet. The library certainly needed it as the letter was directed to Saigon, Indonesia!

Then early Monday morning, 8 February 1965, the radio-alarm clicked on with the 6:30 news from the Armed Forces radio. The calm statement by Secretary McNamara seared over the air, "The President has ordered an orderly withdrawal of dependents from Vietnam!" In spite of the coups, the demonstrations, and the acts of Viet Cong terrorists there were few American service families who wished to have any part of withdrawing, leav-



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ing their husbands, their friends, and leaving undone the many things still to be done.

That very evening the first planeload of evacuees rolled down the runway. If no one in the family had measles or chicken pox and their shot record was up to date, the only thing that slowed down the wheels of evacuation was the mildew on the suitcases!

The day our family could no longer postpone arrived. At Tan Son Nhut Airport the mixture of evacuees, advising troopers, American and Vietnamese friends moved dejectedly in and out among the mounds of luggage tagged with a vivid gold evacuation ticket.

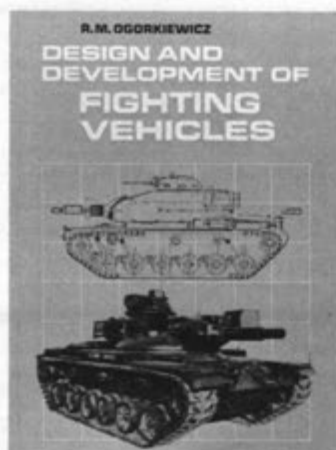
As boarding was announced the terminal came alive in exclamations of Vietnamese, French and English. The Vietnamese Gray Ladies (from the first class in Vietnam) lined up at the gate as an honor guard. Vietnamese friends gave red flowers to the evacuees, because red is the color of hope. Flags of both nations flapped in the winds across

the field, helicopters overhead nodded in farewell, and flash of press cameras punctuated the departure with psychedelic lighting. Our family climbed aboard Flight #293, and left our still-advising Trooper and our friends far behind.

EPILOGUE

During the long flight back to the States many courtesies and much needed assistance was extended to those of us with the Gold Tags. We were back in what we thought was our familiar Western world—until, driving between airports, we saw those were Viet Cong flags flying in a demonstration in San Francisco.

The evacuation ended when we reached our destination, or so we thought. However, people took it for granted that as an evacuee we would share our experiences with church groups, schools, women's clubs and men's clubs (Lions and Rotarians). We did so for our Trooper and for our Vietnamese friends.



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THE UNITED STATES ARMOR ASSOCIATION

CONSTITUTION

(As Amended 11 May 1968)

ARTICLE I. Name.

The name of this Association is The United States Armor Association.

ARTICLE II. Headquarters.

The headquarters of this Association is Washington, D.C., or such other place as the Executive Council shall determine.

ARTICLE III. Object.

1. The aims and purposes of this Association are to disseminate knowledge of the military art and sciences, with special attention to mobility in ground warfare; to promote the professional improvement of its members; and to preserve and foster the spirit, the traditions and the solidarity of Armor in the Army of the United States.

2. There shall be no capital stock, and no distribution of profits to any officer, member or other person, but the entire income of the Association from all sources shall be applied and used in the conduct of its activities and in furtherance of its object as set forth in Article III, subparagraph 1.

ARTICLE IV. Membership and Qualifications for Membership.

1. Members of the United States Armor Association are classified as follows:

- a. Active members.
- b. Associate members.
- c. Honorary members.
- d. Junior members.

2. The qualifications for membership are as follows:

a. Active members: General officers of the Army; commissioned officers, warrant officers and enlisted personnel in the grades of E9, E8, and E7, of any component of the Army or Marine Corps, and former commissioned officers, warrant officers, and enlisted personnel in the grades of E9, E8, and E7 of any component of the Army or Marine Corps who were separated under honorable conditions, who are or have been assigned to, detailed in, or have served in Armor.

b. Associate members: Commissioned officers, warrant officers and enlisted personnel and former commissioned officers, warrant officers and enlisted personnel separated under honorable conditions of the Army, Navy, or Air Force, who are not eligible for active membership.

c. Honorary members: Persons distinguished in military, naval or air service or learning who are elected by a majority vote of the Executive Council. Honorary membership shall be for life or until terminated by resignation or by the procedure set forth in Article IV, subparagraph 4. Such members shall not be subject to the obligations of active or associate members nor entitled to the right either to vote or to hold office. Otherwise they shall have the privileges of members, including the privilege to attend meetings and to engage in discussions.

d. Junior members: Students of the service academies, military schools and ROTC institutions shall be eligible. Annual dues shall be at a reduced rate as determined by the Executive Council. Such members shall not be entitled to vote or to hold office; otherwise they shall have the privileges of members.

3. The ruling of the Executive Council on all applications for membership shall be final.

4. Membership in this Association may be terminated for cause at any regular or special meeting of the Association upon concurrence of three-fourths of the members attending said meeting; but only after the member concerned has been advised by written notice of said proposed action at least twenty days prior to such meeting, which written notice shall have been mailed to his address of record retained in the office of the Association, and only after said member has been given an opportunity to be heard at said meeting. Said member will be given an opportunity to be heard at said meeting if the member indicates his desire to the Secretary-Treasurer prior to said meeting.

5. Active members only shall be entitled to hold office and to vote. Each active member shall have one vote which may be cast either in person or by duly executed proxy.

ARTICLE V. Officers and Their Election.

1. The officers of the Association shall be as follows: President, First, Second and Third Vice-President, Secretary-Treasurer, Editor.

2. The President and the three Vice-Presidents shall be elected at the annual meeting of the Association. A plurality of the votes cast shall be requisite for election. The Secretary-Treasurer and the Editor shall be appointed by the Executive Council as set forth in Article VI.

3. The terms of all officers shall begin immediately after their election or appointment and shall continue for one year or until their successors have been duly elected or appointed.

4. If a vacancy occurs in the office of the President, the unexpired term shall be filled by the First, Second or Third Vice President, in order. If a vacancy occurs in any other elective office, it shall be filled by election at the next business meeting of the Association. The President may, however, make an interim appointment pending said election of a successor.

5. An Honorary President and Honorary Vice-Presidents may be elected by the membership at the annual meeting of the Association from former officers and other distinguished members of the Association. The Honorary President and Honorary Vice-Presidents shall be elected for life or until terminated by resignation or by the procedure set forth in Article IV, subparagraph 4.

ARTICLE VI. Executive Council.

1. The Executive Council shall consist of the President, the three Vice-Presidents, and fourteen other elected members. The fourteen other members shall be elected at the annual meeting of the Association and shall be in the following grades when elected: one general officer, seven field officers, four company officers, and two non-commissioned officers. A plurality of the votes cast shall be requisite for election. The terms of the fourteen other elected members shall begin immediately and shall continue for one year or until their successors have been duly elected. In addition, the Executive Council shall appoint the Secretary-Treasurer and the Editor before the close of the month in which the annual meeting is held. Upon appointment, the Secretary-Treasurer and the Editor shall become members of the Executive Council.

2. The Executive Council shall manage the business and property of the Association consistent with law and

this Constitution; shall have power to make and amend the By-Laws for its own government, which By-Laws shall not be inconsistent with law or this Constitution; and shall have the power to provide in the By-Laws for the appointment of such other officers, agents and/or employees as it shall deem necessary and proper, and to prescribe their duties and compensation.

3. If a vacancy occurs in the office of one of the fourteen elected members of the Executive Council, it shall be filled by election at the next business meeting of the Association. The President may, however, make an interim appointment pending said election of a successor.

ARTICLE VII. Advisory Council.

The Executive Council shall be assisted by an Advisory Council, consisting of senior Armor commanders and others. The Executive Council shall appoint the Advisory Council before the close of the month in which the annual meeting is held.

ARTICLE VIII. Meetings.

1. The annual or regular meeting of the Association shall be held during the first half of each calendar year.

2. Special meetings may, and upon the written request of twenty members shall, be called by the President at other times.

3. One month's notice of regular and special meetings shall be given. Such notice shall be deemed to have been given when published in an issue of ARMOR at least one month before such meeting, and a copy thereof mailed to each member at his address of record retained in the office of the Association.

4. Five percent of the active membership of the Association, present in person or by proxy, shall constitute a quorum for the transaction of business, provided that at least ten active members are present in person.

ARTICLE IX. Amendments.

1. This Constitution may be amended or repealed by a vote of two-thirds of the active members of the Association present in person or by proxy at a duly called meeting of the Association, provided that the notice of such meeting shall contain a notice of intent to amend or repeal as well as a copy of the proposed amendment or repeal. Recommendations for amendment or repeal shall be presented to the Secretary-Treasurer in writing signed by not less than ten active members of the Association at least two months before the date of the meeting at which the proposed amendment or repeal is to be considered.

BY-LAWS

(As Amended 1 February 1968)

ARTICLE I. Object.

1. In furtherance of its aims and purposes, this Association shall publish with such frequency as may be determined from time to time by the Executive Council, a professional and scientific journal to be known as ARMOR, and shall conduct a book department for the sale of books, binders, prints and other appropriate items to its members and to the general public.

2. The object of this Association may be further promoted by such other lawful means as the Association or its Executive Council from time to time shall deem appropriate.

ARTICLE II. Membership.

1. Any person desiring to become an active or associate member shall make application to the Secretary, which application shall set forth facts establishing his eligibility and be accompanied by the payment of at least one year's dues, the amount of which shall be determined from time to time by the Executive Council. The applicant's eligibility appearing, the Secretary may grant the membership.

2. All active and associate members shall receive the Journal, ARMOR, without cost other than the annual dues. All honorary members except those in active service shall receive the Journal, ARMOR, without charge. Junior members shall receive the Journal, ARMOR, at the special membership fee.

3. Any member may withdraw from the Association at the end of any current year by tendering his resignation; and membership shall lapse ipso facto upon failure to pay the annual dues; but such withdrawal or lapse shall not operate to relieve any such member from liabilities said member may have incurred prior thereto as a member of the Association.

4. Any other person, armed forces unit, civilian industry, library, association, educational institution, etc., may subscribe to the Journal, ARMOR, upon the payment

of the appropriate subscription price. Such applications will be subject to the approval of the Secretary and, when approved, the applicants will be considered subscribers only.

ARTICLE III. Officers.

1. The offices of Secretary-Treasurer and Editor may be held by one and the same person.

2. The duties of the officers shall be such as usually pertain to their respective offices. The officers may receive such compensation for services performed as these By-Laws may prescribe.

ARTICLE IV. Executive Council.

1. The President shall ipso facto be the chairman of the Executive Council, and in his absence the First, Second or Third Vice-President, in order.

2. In the event all four of the above officers are absent, the senior Council member present shall act as chairman of an Executive Council meeting.

3. Twelve of the members of the Executive Council shall constitute a quorum for the transaction of business.

4. A majority vote will govern in all matters acted upon by the Council.

5. The chairman of the Executive Council will provide any or all of the following subcommittees when the Council deems them necessary to carry out the provisions of the Constitution and By-Laws:

- a. Nominating committee.
- b. Auditing committee.
- c. Investment committee.
- d. Gifts and bequests committee.

6. It is desirable that a number of the members of the Executive Council be residents of the vicinity of the headquarters of the Association.

ARTICLE V. Amendment.

These By-Laws may be amended or repealed by a majority vote of the members of the Executive Council.

CS1-1968

TEXT: 1LT WILLIAM F. THIEL, JR., AND 2LT ANTHONY R. WAGNER

PHOTOS: SP5 THOMAS S. BARRETT, SP4 WILLIAM A. FIX AND SP4 N. A. ROBERTS

INFORMATION OFFICE, U.S. ARMY ARMOR CENTER

The balmy Kentucky afternoon air is shattered by the rolling booms of tank and howitzer fire, the staccato of machineguns, and the screaming thunder of jet aircraft. Tanks roar into hull defilade on a small knoll some 2000 meters from Hill 732, poised and ready. Artillery is pounding the hill with thunderous barrages, paving the way for the forthcoming attack by Task Force 2d Battalion, 13th Armor.

This action is part of the Armor Mobile Forces Firepower Demonstration and Mounted Tactical Exercise (CS-1) conducted annually at Fort Knox, Kentucky before thousands of spectators.

SITUATION

The 25th Armored Division, supported by tactical air, is conducting an exploitation to the north with the 1st Brigade on the east and the 2d Brigade on the west. The 3d Brigade is in reserve following the 2d Brigade.

The division armored cavalry has been operating between and slightly to the front of the leading brigades. The division's mission is to seize crossing sites over the Salt and Ohio Rivers and to be prepared to continue the attack to the north. Task Force 2d Battalion, 13th Armor (TF 2/13), a part of the 1st Brigade, is moving north some 2½ miles to the south of Hill 732. Air and ground cavalry elements are in front of TF 2/13 when they find a strong enemy force atop Hill 732.

The land forces involved in CS-1 are furnished by the 194th Armored Brigade, commanded by Colonel Robert L. Freeland.

CS-1 requires most of the component units of the 194th Brigade to simulate the 1st Brigade, 25th Armored Division. The seizure of Hill 732 by TF 2/13 is portrayed by elements of the 4th Battalion, 37th Armor and the 4th Battalion (Mech), 54th Infantry.





ARMOR ATTACKS

The brigade commander orders the task force commander to seize Hill 732. Two scout helicopters from the divisional air cavalry troop reconnoiter by fire a suspected enemy location to the right of Hill 732. Upon receiving enemy fire, the aero-scouts call in a fire mission for the aero-weapons helicopters. Two Huey gunships engage the enemy with rocket and machinegun fire. The enemy is silenced.

Three M551 Sheridans engage the enemy with both conventional rounds and missiles. The support squad moves into position and fires on Hill 710 with 4.2-inch mortars. The role of armored cavalry is portrayed by the M114s, M113A1s and M551s of Troop D, 10th Cavalry.

The TF CO orders his tank heavy team to attack from the right and the mechanized infantry heavy team from the left. He also requests an immediate air strike by the Air Force through his tactical air control party (TACP).

TF 2/13's tank heavy team, portrayed by elements of the 4/37 Armor and the 4/45 Infantry, moves forward to engage the enemy some 2000 meters away on Hill 732. The task force commander calls for divisional artillery fire support which is delivered by the self-propelled howitzers of the 3d Howitzer Battalion (SP), 3d Artillery. The heavy mortar platoon of the 4/37 Armor thickens the fires put on the objective.

The teams move out simultaneously toward Hill 732.

The tank heavy team immediately encounters a deep, narrow gorge. An AVLB Section is called up and places its bridge. The team continues to move toward the objective with the artillery firing air bursts to fix the enemy.

Airstrikes by F4E Phantoms of the USAF 33d Tactical Fighter Wing and artillery and mortar fires continue to soften up the opposition. As the teams near the objective, fires shift to deeper targets. TF 2/13 seizes Hill 732 displaying the firepower, mobility, and shock effect characteristic of Armor.

The extensive communications necessary for the CS-1 demonstration are provided by the Communications Platoon of Headquarters Company, 194th Armored Brigade. Mine detonations and simulated enemy artillery and mortar fire are the work of the 522d Engineer Company.

In addition to the armor in the attack demonstration, CS-1 includes phases during which those attending see each armor platoon type, and many combat support elements, complete with all authorized men and equipment. Each of the weapons of the armor arsenal is fired in such a way that an indelible impression of the full capabilities is gained.

One leaves this exhibition of the mounted combat team—ground and air cavalry, tanks, mechanized infantry, artillery, tactical air, command and control elements, the underlying logistical support—convinced more than ever that Armor continues to be—

THE COMBAT ARM OF DECISION.



*men and machines
show a concept
in action*



Armor in an Area War

by

Major General Arthur L. West, Jr.

and

Colonel Donn A. Starry



This final article of the series outlining field evaluation of armor and mechanized operations in Vietnam reviews doctrine, tactics, and techniques. Much on this subject has appeared in *ARMOR* articles describing unit operations and personal experiences. It is our purpose therefore to estimate briefly the impact of these experiences and operations on doctrine, tactics, and techniques currently in vogue.

DOCTRINE

Doctrine is "that which is taught." Given this, one can isolate some highlights from armor-mechanized experience in Vietnam which generally affect what has traditionally been taught about tactics and techniques or armor-mechanized operations. Current doctrine, drawn from World War II and Korean experience is not defunct. However, it does require some expansive application of proven principles to adapt to this new kind of war we find in Vietnam, and which, given the world today, we may face another day on other fields. First, some broader principles, then some minor tactics of more than passing interest.

The war in Vietnam is an area war—the fight is in every direction. Our doctrine normally describes linear battle areas, with fronts, boundaries, lines of contact, places where the enemy is, and others where he is not. For experience in area war the US Army must hark back to the nineteenth century Indian wars. As a consequence we may have been slow to recognize formally the twentieth century reappearance of area war.

Physical environment influences operations to that degree spelled out in the first part of this series. The striking lesson of Vietnam is that our

mechanized equipment enjoys far greater utility in fundamentally hostile physical surroundings than many had thought possible. Conservatively drawn terrain estimates, an influence toward overcaution, are in turn offset by imaginative planning and inventive application of field expedients to achieve rather extensive mobility with mechanized gear. The lesson—don't underestimate the potential of mechanized-armor units in underdeveloped areas where the physical landscape appears at first blush to be hostile to their presence.

The enemy contributes his peculiar flavor to the Vietnam war, suggesting some new doctrinal considerations. On the one hand, North Vietnamese Army (NVA) units are an almost conventional enemy, fighting in units and in more readily recognized patterns. The Viet Cong (VC) are another matter. Entire villages may be organized to support with food, clothing, and other supplies, one or more main force VC battalions. Villagers are indigenous, fighting personnel are generally outsiders. Finally, there is the guerrilla-farmer or laborer by day, terrorist by night; living off his land and his family. Whether VC or NVA, regular or non-regular, the enemy apparently plans in detail, to include rehearsals. Frequently, however, some rigidity seems to characterize execution. Reserves are often held as a getaway force not committed to a fight. The enemy seldom attacks without sensing victory through numerical disparity or surprise. Hence ambush is his preferred tactic, the night his favorite medium and the landscape his refuge when confronted by superior forces and fires. With relatively unsophisticated firepower, the foe in Vietnam has made superb use of battlefield debris for fabricat-

ing mines and booby traps, of Soviet antitank grenade launchers (*RPG2* and *RPG7*), recoilless rifles and rockets launched from crude but efficient platforms. The doctrinal lesson—don't sell your irregular enemy short by characterizing him as a rude bumpkin. He is in truth a clever fellow of considerable resourcefulness. The doctrinal sweep must be broad enough to include him in all his roles—regular and irregular, organized and guerrilla.

Missions assigned US forces in Vietnam contribute to restoration of population and resource control by the Government of South Vietnam, and the subsequent progress of nation building. In furtherance of this broader goal, US forces in Vietnam conduct offensive operations over wide areas with units from platoon to several divisions in size. Logistical support comes from semi-permanent base camps which are in turn supported from logistical base enclaves near deepwater ports. Tactical operations usually target the enemy rather than terrain. Base camps and logistical installations must be secured, normally with combat forces.

Enemy action may come from any direction at almost any time. Units deploy to any sector on short notice. Supporting fires are required all around. Fire bases must be secured, reaction forces set aside for contingencies and ground lines of communication opened, cleared, and secured.

Area war has enlarged our mission vocabulary. Search and destroy operations find and destroy enemy installations, forces, supplies, and equipment. In classic terms search and destroy is an area reconnaissance, hopefully resulting in a meeting engagement, and subsequent generation of sufficient combat power to destroy the enemy. Clear and secure operations are more like classic attacks to secure terrain, clear an area of an enemy, and secure it against his return. Clear and secure operations are of more sustained duration than search and destroy, and emphasize security of population and resources.

Security missions—convoy, route, base, and area receive proportionately more attention in area war, since every foray from a base, whatever its purpose, requires security, as does the base itself. Armor-mechanized forces are of course ideally suited for security missions, and peculiarly well suited to the reaction force role. This does not say that doctrine must necessarily change; only that what is taught should expand naturally to recognize these lessons.

Doctrine for mechanized infantry currently emphasizes the personnel carrier as a means of trans-

porting infantry to battle. In Vietnam, mechanized infantry units often use the carrier as a vehicle from which the infantry fights, dismounting to rout the enemy from tunnels, bunkers, and holes.

To improve fighting vehicle capabilities, *M113s* in Vietnam have been equipped with a variety of devices including gun shields for caliber .50 machineguns, side-firing *M60* machinegun kits, sandbags or boiler plate parapets outboard of the cargo hatches so that infantry may fire over the side. Scout section *M114s* in armored cavalry units have been replaced with *M113s*, which scout sections and squads use as they would a scout vehicle, that is, as a fighting track. Tanks in the armored cavalry platoons of the 11th Armored Cavalry have been replaced with *M113s* equipped with an armored turret for the commander and two side-firing *M60* machineguns.

This armored cavalry assault vehicle (*ACAV*), well documented in the pages of *ARMOR*, is similarly a vehicle for mounted combat. This use of the *M113* is made possible by an absence of significant enemy anti-armor capability, a pattern we may expect to see repeated in combat in developing areas against a relatively lightly armed enemy. Hence it is only prudent that doctrine include mounted combat for infantry and use of the *M113*, or its successor, as an assault vehicle.

Armored cavalry squadrons in Vietnam are more frequently employed as combat maneuver battalions, than in their doctrinal role as forces for reconnaissance, security, and economy of force. Armored cavalry is an ideal force when rapid reaction, swift movement, high volume firepower and aggressive pursuit are required. The ready-made combined arms team organization of armored cavalry makes it even more attractive when quick reaction demands limit time available to tailor a task organization for combat. Doctrine for armored cavalry should emphasize that it may be employed as a combat maneuver force at least as often as in more conventional roles. Vietnam experience also suggests another look at the doctrinal basis of assignment for armored cavalry units. Is a troop per brigade, squadron per division, regiment per corps sufficient for operations in developing areas?

One air cavalry squadron has been employed in Vietnam since 1965. Recently, two more have been committed there. All have been committed almost continually to combat operations in reconnaissance, security, and economy of force roles, as well as offensive and defensive combat. The March-



*The
airborne command post
tends to cost . . .*

April and May-June 1968 issues of *ARMOR* both contained articles on air cavalry in Vietnam. Doctrine for this new medium is still aborning—that which is taught must come abreast of new developments almost daily.

Doctrine currently favors the use of infantry as a pressure force, and armor as an encircling or exploiting force. The helicopter has wrought some change to this principle in Vietnam. There, armor moving rapidly on the ground becomes the pressure force, while infantry, airmobile at ninety knots is an ideal maneuver force. It is recognized that absence of a sophisticated enemy anti-air threat makes this possible. However, the facts indicate a need for extensive application of current experience to developing doctrine which recognizes the potential of air cavalry in emerging areas.

Doctrinally, dismounted infantry should lead armored vehicles through wooded areas. The enemy's extensive use of anti-personnel mines and booby traps in Vietnam, and his propensity for jungle ambush, have caused American units to reverse this procedure. Now tanks and personnel carriers lead infantry through the jungle, breaking trail, destroying anti-personnel devices, clearing a path. The infantry follows to destroy enemy installations, equipment, and supplies. Thus there has developed a reversal of traditional roles for armor and infantry, a fact which should again stimulate imaginative expansion of doctrine.

Organization for combat by cross-attachment is widely practiced in Vietnam. Indeed, were it not for the inherent flexibility of the ROAD organization, an inability to readily organize for combat based on mission-enemy-terrain-troops available

might have seriously impaired our ability to adjust to Vietnam's unique fighting conditions. Continued emphasis on this aspect of doctrine should make this practice second nature to small unit commanders.

Now some aspects of what is taught about tactics and techniques.

COMMAND, CONTROL, COMMUNICATIONS

Absence of landmarks and dense vegetation make accurate position determination and land navigation difficult in Vietnam. Control of unit movement from a helicopter can help. Artillery marking rounds (smoke, air burst, illuminating), vehicular compasses and lensatic compasses in conjunction with dismounted radio sets all have been used to good advantage. A wide variety of methods and material should be taught and developed to help those in the field with this problem.

The helicopter enables the commander to move about rapidly as never before. However, the airborne command post tends to cost the commander his "feel" for the ground war. One squadron commander reported ten percent of his time spent in his jeep, forty percent in his command track and the remainder in the air in a calculated attempt to avoid this problem.

Commanders must resist continually the temptation to oversupervise subordinates from a heliborne CP. There is always a danger that junior leaders could come to depend on receiving detailed guidance and thus lose that initiative which is so essential to successful combat operations. The chain of command must at all times be respected and strengthened.

INTELLIGENCE

Accurate, timely intelligence is a major problem in Vietnam. Routinely US units conduct day and night patrols. With characteristic elusiveness the enemy frustrates most routine patrol efforts. Consequently specialized patrol operations have become the rule rather than the exception.

Long range reconnaissance patrols (LRRP) frequently are used to provide advance information for long range planning. Saturation patrolling, a sort of area reconnaissance with multiple patrols, is widely practiced. In other situations, checkerboard patrolling involves dividing battalion areas of responsibility into a pattern of smaller areas to which platoons are assigned for operations of several days duration. On contact the battalion directs adjacent platoons to converge, establish ambush, or move to blocking positions. Random platoon movement enables a limited force to deny the enemy a reasonably large area. In a battalion operation, one company—preferably airmobile, provides an adequate reaction force. Stay behind patrols are used to trap VC foragers who frequently enter an area after US forces leave.

Finally, local informant nets, police, village officials and enemy returnees are sources of information exploited to good advantage. In this most difficult informationless sort of war, new ways of seeking and finding the enemy must be sought and taught.

FIREPOWER

Most kills by armor-mechanized units are the result of machinegun and tank gunfire at close ranges. Rarely do fields of fire require or permit use of the long range capability of tank cannon. Ninety percent of the tank gun ammunition fired is canister. This is used to destroy anti-personnel mines and booby traps and knock down foliage, as well as to kill the enemy. Fire support units in Vietnam must deliver fires on short notice in any direction; positioning guns for direct or indirect fire through 6400 mils. Security of fire support bases by supported units requires combat forces to be held out for the security mission. By positioning reaction forces and command-control elements with the fire support base, the drain on combat forces required for security can be held to a minimum.

Tactical air fires are normally controlled by forward air controllers operating from light observation aircraft. Dense foliage and generally inaccurate position location combine to make air fire control from the ground virtually impossible. The abundance of US fire support makes fire support coordination more important than ever before, and the presence of helicopter gunships adds yet another dimension to the fire support coordination problem. Organic indirect fire support, 4.2 inch mortars of armor-mechanized units, are usually grouped at troop or battalion/squadron, possibly even division level, since the minimum range of this weapon

*... the commander
his feel
for the ground war*



makes difficult its use directly in front of perimeters in which it is positioned.

MOVEMENT

Battle drill and combat formations are important parts of armor-mechanized unit SOP in Vietnam, especially in reacting to ambush. The herringbone formation (see *ARMOR*, May-June 1968) is used to bring fire on the enemy when forward movement has been stopped, and deployment off the road or track is not practicable. Wheeled vehicles trapped in the ambush take refuge inside the formation. In breaking trail through jungle an inverted wedge is preferred since it leaves only the two forward tubes restricted by vegetation. The echelon formation with primary direction of fire reversed to avoid tube traverse restrictions in dense growth is also practiced. Tanks and *M113s* in Vietnam normally operate with hatches open until contact is made. Crew members wear body armor. Personnel carriers are sometimes buttoned up in areas infested with overhead booby traps, but because of the mine problem, crews prefer to ride in open hatches or atop vehicles. Mine blast blows them off or out, reducing the seriousness of injuries they might have sustained had they been buttoned up. Tank commanders sometimes fire the cannon; the gunner rides shotgun with an *M79* on top of the turret. At least part of the great utility enjoyed by the *M113* in Vietnam is a result of ingenious expedient devices adopted to sustain movement in paddy and swamp. Simple block and tackle, tandem tow cable hook-ups, push bars, and capstan kits have all been used to advantage.

SERVICE SUPPORT

Unit combat trains in Vietnam normally contain only essential personnel, high mortality spares, maintenance and recovery equipment and some Class I, III, and V supplies. They travel with the unit command post to facilitate security. Unit field trains normally support from a relatively secure base camp. Air resupply, evacuation, and transport are extensively used since most roads in the theater are not secure enough to permit routine resupply overland. Cross-country wheeled vehicle movement is impossible in most areas—highlighting the need for full tracked cargo carriers, for which the *M113* now serves as a stand-in. Armor-mechanized units carry greater organic supply loads, have greater operational sustainability, and require less resupply than other units.

OTHER COMBAT CAPABILITIES

Area war demands greater attention to details of all-round security. Since the enemy's greatest capability is ground attack without extensive fire support, open terrain affords better defensive perimeters against enemy attack than jungle—better fields of fire, better opportunity to use radar, searchlights, wire, mines, flares, listening posts, and patrols. Tighter perimeters are the rule; dispersion the exception.

Increasing incidence of enemy mortar and rocket attack requires facilities to be sandbagged or dug in. Bulldozers or tank dozers dig positions for CPs, vehicles, sleeping tents, and supplies. Whether armor or mechanized infantry, when not moving a unit should dig in.

US forces enjoy a significant technical advantage over the enemy at night, with radar, searchlights and anti-intrusion detectors, as well as less sophisticated flares, mines, and booby traps. Enemy preference for night operations suggests that we may not have made the best use of our technological advances.

The doctrine of fire and maneuver is perhaps more difficult to apply in Vietnam than in the past. The enemy avoids being fixed in position, hence coordinating contact, maneuver and firepower is a difficult problem. Contact in dense jungle is often at point blank range. This inhibits supporting air and artillery fires. Withdrawal to allow delivery of fire support, even for a short distance means breaking contact and thus allowing the enemy a chance to escape. Fires across avenues of egress help prevent his escape, but sufficient contact must be maintained to hold him while fire support is being delivered. This requires good timing and is a most difficult trick to master.

POSTSCRIPT

These brief articles, of which this is the last, have summarized the outcome of extensive field survey of armor-mechanized operations in Vietnam. The findings are neither startling nor revolutionary. Two facts stand out. First, it is most apparent that our mechanized equipment has found a much more utilitarian role in this hostile environment than many had thought possible—testimony to its versatility and adaptability; a lesson for military planners and weapon system designers. Second, and most inspiring, is the ever-present resourcefulness, the dedication, and the remarkable guts of the American soldier.

A horse goes to Fiddler's Green

"Chief"-1/84



On Friday 24 May 1968 at the ripe old age of 36 "Chief," the last Cavalry horse on United States Army rolls, quietly ambled down the curving path to the verdant pastures of Fiddler's Green. There he joined that equine throng whose members look contentedly at their now dismounted troopers. Occasionally heads raise from grazing and knowing ears come to the alert as the names of battles and campaigns fought long ago are limned as part of oft-told sagas—Cowpens, Horseshoe Bend, Resaca de la Palma, Churubusco, Black Hawk, Brandy Station, Gettysburg, Yellow Tavern, Grierson's Raid, Comanches, Modocs, Apaches, Cheyennes, Tientsin, Philippines and Mexican Border.

"Chief" is now part of that four-footed host bearing such names, some common and some colorful, as "Old Whitey," "King Philip," "Comanche," "Rienzi" and "Trooper," "Blaze," "Star," "General," "Old Joe," "Brownie" and "Bad Axe." During war, peace, and that nether state which has so often faced our Army, these quadriped heroes shared the hardships and triumphs of their riders as they bore them onward in the advance of American arms.

"Chief" never heard a shot fired in anger, except perhaps by some bolo on the pistol range. But he was a warm and living symbol of a form of battle-field mobility that had served the Nation well until, like the full-rigged man-of-war, it was supplanted by technological developments which were but a dream a century, or even a few decades, ago.

Living in well-earned retirement at Fort Riley since 1949, "Chief" enjoyed a panorama denied his

forbears. He saw the latest mounts—the M60A1, the M113, the Sheridan, and the newest helicopters. Wise and gentle, he accepted the inevitable and even seemed to give these novel steeds his benediction.

The flesh and bones lie beside the "Old Trooper" monument. Modelled after the sketch Frederic Remington did for The United States Cavalry (now Armor) Association which has long appeared in its journal, the statue portrays the spirit of man and mount. This rides on undiminished.

It was appropriate that those who wear the crossed sabers and yellow trimmings were well represented at the dedication of the bronze tablet marking the final resting place of the Cavalry horse. The Armor Association President, General John K. Waters, unveiled the memorial. Lieutenant General Charles G. Dodge, an Honorary Vice President, delivered the principal address. Retired troopers from "Chief's" old units, the 9th and 10th Cavalry Regiments, were there in force. A squadron of today's 9th Cavalry stood tall alongside their comrades-in-arms from the 5th of the 32d Armor, the 1st of the 63d and the 2d of the 70th. When all was properly attended to, the Yellowlegs marched off, battle streamers and guidons flying, to the strains of "Sabre and Spurs" toward further glories.

The oldtimers present blew their noses and wiped their spectacles. The young scouts, riflemen, and tankers in ranks thought they understood. The Army brats in the crowd knew they did. A faint and happy whinny was heard from across the plains. OWM, JR.



THE BANQUET ADDRESS INTRODUCTION

by General JOHN K. WATERS



Once again I want to express my appreciation to you for having accorded me the privilege of serving again as your president.

I know that each of you joins me in thanking General Hollis, Colonel Cobb, Colonel Wallach and their people who have worked so hard and so successfully to present to us today the latest developments in our chosen field and to give us the basis for some sound thinking and discussion about where we stand and where we are headed.

For a further look into the future,

this evening we are happy to have with us the member of our Association who heads the American side of a joint effort to develop for the Free World the best main battle tank ever fielded.

Major General Edwin H. Burba received his commission as an ROTC graduate of the University of Oklahoma. He entered the service as a second lieutenant of field artillery in 1935.

During World War II he went overseas with the 68th Armored Field Artillery Battalion of the 1st Armored Division. When the battalion commander was wounded, he assumed command. Under General Burba's command, the 68th was the first American field artillery battalion and one of the first Armor units to win the Presidential Unit Citation for its part in stopping the German advance in Tunisia. Shortly thereafter, he was wounded and evacuated to the United States.

Later in 1944 he returned to combat in Europe as G3 and then as Commanding Officer, CCB of the 8th Armored Division.

After duty on the Army General Staff and in the Office of the Undersecretary of the Army, he was Chief of Staff of the 3d Infantry Division during the Korean War. Then followed another tour in the Pentagon

and command of CCB, 4th Armored Division, in Europe.

Following command of the Seventh Army Training Center at Vilseck, General Burba was Deputy Director for Operations (J3) with the Joint Chiefs of Staff.

In December 1962 he became Division Artillery Commander of the 2d Armored Division and two months later was promoted to division commander. With General Burba at its helm, the 2d Armored Division participated in two of the largest and most important exercises held in recent years. The first was BIG LIFT in the fall of 1963 which saw the 15,000 personnel of the division airlifted to Germany in 63 hours. On arrival, their pre-positioned equipment was manned and employed in a NATO maneuver. Then in mid-1964, the "Hell on Wheels" Division was a key unit in Exercise DESERT STRIKE.

Prior to his present assignment, General Burba was Chief, Joint Military Assistance Advisory Group, in Korea.

General Burba is now U.S. Project Manager for the Main Battle Tank 70.

It is an honor and a pleasure to introduce General Burba who will bring us up-to-date on the MBT70 project.

THE MBT 70 TODAY

by Major General EDWIN H. BURBA

General Waters, Gentlemen:

I am glad to have the opportunity to discuss with you this evening a subject which bears directly on the central theme of this annual meeting—"The Present and Future Role of Armor." The role of Armor will be limited in the future, as it has in the past, only by the performance capabilities of its principal weapons system. Therefore, a description of the tank we expect to field early in the

'70s should give this elite group of Armor tacticians a basis for projecting their vast experience in campaigns of the past into the mid-range future. Also, an understanding of the joint German-American Main Battle Tank Co-Development Program will provide a better basis for support by the Armor Association as we approach a production decision early in 1970.

It is essential to a thorough understanding of this rather unique

R&D effort to first gain an appreciation of the constraints imposed by its bi-lateral nature.

There are two facets to this program. One is the US unilateral side in which the dreams of the US users are bumped against the realities of the state-of-the-art in electronics, hydraulics and mechanics. To assure that the best brains of US science and industry are brought to bear on these problems requires big money and that gets us involved in the bat-



tle of the budget where the competition is keen and the program reviews frequent.

The other facet is the international side where American requirements for a particular kind of tank are bumped against German requirements. In this arena all basic management decisions have to be agreed to by both sides, so where military tactics and doctrine differ and national political and economic factors are in conflict, considerable persuasion is needed to reach decisions which we can live with.

ARMOR Magazine and other publications ran articles last fall on the MBT70 program, but to place in context our subsequent discussion, I should like first to review briefly the history of the program.

The idea of an international co-development program was preceded by a German-French co-development program in the late '50s which resulted in the German Leopard and the French AMX30 tanks. After the development program was completed, each country turned out a different prototype without a firm agreement to choose the better of the two, or the best features of each. The result was two separate tanks. When the Leopard was placed in production in 1961, the Germans expressed interest in starting a new co-development program with us. This program was to be designed as closely as possible to produce a tank to meet the needs of all NATO countries and it had the added stipulation that the result of the development program would be a single tank, producible and logistically supportable in both countries.

After an exchange of correspondence for a year or so, Secretary McNamara and Minister von Hassel entered into a basic agreement in August 1963. The agreement provided for a two-man program management board to direct the joint program. Development costs were to be shared equally by both countries and provision was made to allow third parties, meaning other NATO countries, to join in the program either as co-producers or customers of Germany or the US. In addition, the joint agreement provided for the development of a heavy equipment transporter for this tank and for general cargo. Subsequently, on a unilateral basis the US has conducted preliminary studies which will lead to the production of an armored recovery vehicle,

armored vehicle launched bridge and a combat engineer vehicle on the MBT70 chassis.

From August 1963 through July 1964, an organization and agreed procedures were developed for the management of the program. The users of both countries met jointly several times and developed agreed joint military characteristics. From July 1964 through March 1965, 14 basic concepts with about five variations each were considered in a parametric design/cost effectiveness study done with computers by Lockheed. The computer was programmed to run each of the several tank designs through multiple small unit actions in both offense and defense. A group of Armor captains laid out the tactics of each battle based on actual terrain in the Fulda Gap area of Germany. This study resulted in a compromise between the two most promising concepts and furnished the basis for our present design. A high level meeting was held in March 1965 at which a final selection of the concept was made.

From March through November 1965, the engineering design had progressed far enough to release for procurement long leadtime items for pilot fabrication. Development tasks were assigned each country by major components or subsystems of the tank. The FRG was given the largest share since American industry at that time was well occupied and German technology had experienced a 12 year hiatus after World War II. The hull and turret were assigned to the Joint Engineering Agency composed of government engineers of both countries. In the case of high risk items such as a new variable compression ratio engine, for which the US assumed responsibility, a backup development program was assigned to the other country. A development contract was awarded in October 1965 to General Motors for the US work and to the German Development Corporation (DEG) for their work. These two prime contractors employed numerous subcontractors and furnished design engineers to work together initially in Augsburg, and since July 1966 in Detroit, to assure proper interface compliance and configuration control.

From November 1965 until May 1966, design work progressed just ahead of the construction of an engineering mockup. Upon completion, the mockup was reviewed by the joint users and the Vice Chiefs of

Staff of the US and German Armies, who approved the design for the pilot build. The first pilot was delivered last July and was first shown publicly at the AUSA convention in September. That was only an automotive pilot since the exchange of



fire control equipment, automatic loader, night sights and many other components is only now being completed. We now have four pilots and are actively engaged in installing full equipment in each of them. Two more pilots will be finished by September, making a total of six in each country.

Engineering design tests by our contractors have been proceeding actively in laboratories, on test rigs and in pilots for some time. Engineering tests will start at Aberdeen and White Sands next February. As test results are acquired, necessary changes in design will be fed into our advance production engineering (APE) program and will be included in six APE pilots which will follow on as a second generation for confirmatory tests.

We are extremely optimistic that we will be able to meet the joint military characteristics prescribed by our users in all important aspects. When this is accomplished we will have a weapons system that vastly increases the first round hit probability as compared with the M60. The MBT70 has a fire-on-the-move capability which is quite impressive. It launches the Shillelagh guided missile out of the same tube that fires a fin stabilized 152mm kinetic energy round at the same high velocity and accuracy as the 105mm gun on the M60.



The suspension system is hydro-pneumatic, which permits road wheel travel some 14" higher than the torsion bar system on our present tanks. This affords a much more stable gun platform and makes possible the stabilization of the sights, the main weapon and secondary weapon for shooting on the move.

During one comparison test, the M60 was run over obstacles of the same height at Detroit Arsenal as those of a course in Germany over which the German MBT70 suspension test rig was operated. The test rig has the same center of gravity and the same weight as the MBT70. The speed of the M60 was six to nine mph. The speed of the MBT70 test rig was 20mph. Even though his speed was less than half that of the MBT70, the M60 driver had to stop once to regain control of the tank. I am told that he had cut his lip rather badly at this point.

The variable ground clearance feature is a bonus of the hydro-pneumatic system which will no doubt prove valuable in special situations but would not have been included if complexity or cost had been materially increased.

The horsepower per ton ratio is twice as great as the M60, thus increasing cross-country agility by a factor of 2.

The MBT70 has a temperature and humidity control system which provides the crew with filtered air. This feature, together with the improved suspension system, will permit tank crews to make long marches and jump off into the attack in much better physical condition.

The cruising range of the new tank is designed at 400 miles, which represents a 28 percent improvement over the M60. It has an immediate fording capability twice that of the M60 without the installation of a kit and much deeper with the kit.

As for armor protection, a new design of spaced armor and high performance steel outer plate greatly increases frontal ballistic protection.

This completes the highlights of the improvements in performance we expect to obtain. Now that hardware is being exchanged between the contractors of both countries and complete tanks are being assembled, we are running into a few technical problems. With one exception, I am satisfied that our contractors are

ponents of the tank been newly designed at one time. The oldest thing on this new tank is the Shillelagh missile.

One of the most common criticisms of the present design is its high degree of sophistication and complexity. I suppose that change has been made with each significant advance in weapons system since the cave man's club. I feel that we have anticipated maintenance requirements by developing "GO" "NO-GO" test equipment and black box modular replacements for the complicated elements of the tank. In accordance with a Brown Board recommendation, we are planning a "flying hour" concept of perishable component replacements. For example, when an engine has X hours on it, a replacement arrives automatically for installation.

The program managers' philosophy from the beginning has been to make an honest effort to meet every one of the joint user's performance requirements. This has led to complexity and spiraling development costs. As a result I have spent a good share of my time the past 20 months negotiating with the Ger-

"One of the most common criticisms of the present design is its high degree of sophistication and complexity."

The secondary weapons system has a casemate mount which pops up and rotates 360 degrees with antiaircraft elevation capability. It is controlled electrically by either the gunner or commander while the tank is buttoned up. The gun is presently a 20mm but the tank may be retrofitted with a larger gun when available. There is an antiaircraft automatic lead computer which makes it much better in this role than the .50 caliber on our present tanks.

The new tank will have passive night vision which will permit battlefield surveillance, target acquisition and accurate fire control of the main weapon, as well as the secondary weapon, without the use of infrared or other illumination which could be picked up by an enemy.

In regard to mobility, the acceleration, speed and operator control represent a vast improvement over present tanks.

among the best in both countries and, if the very high joint military characteristics are possible to attain within the state-of-the-art today, they will be attained.

In assessing the time required to complete this development program, one must remember that design work was not undertaken until November 1965. Secondly, this is a joint program and management decisions have to be negotiated. And thirdly, this is the first tank that has been designed from the ground up as an integrated weapons system. The principal objective has been to provide a major improvement in fire-power, mobility and armor protection in one jump.

Previously, changes in US tank design have been evolutionary from the WW II M26 through the M60A1E2. A turret was changed here, an engine or transmission there, a new weapon on an old tank on another occasion, but never have all com-

ponents and defending in DOD an increase in the joint development fund ceiling.

The product of these expenditures has got to be good. I am convinced that it will be given the patience and cooperation of the test agencies to determine weaknesses and to get them corrected.

In conclusion, let me say that being a project manager and the program manager of an international program may at times be frustrating, but I can assure you, it is never dull. I have more help than I ever had before, ranging from the many interested lateral agencies to supervision from above. I find my situation as a project manager, who bears ultimate responsibility for the end product, quite different from the free-wheeling critic I once was as a user—which proves the accuracy of one of Will Roger's epigrams: "It is a lot more fun to twirl the rope when someone else's neck is in it."



THE REPORTS OF THE SECRETARY-TREASURER

THE BUSINESS MEETING

The 79th Annual Business Meeting of the membership of The United States Armor Association began at 1115 on Friday, 10 May 1968. Over 230 active members were present in person and 834 by proxy. Together this was more than enough for a quorum.

The Secretary-Treasurer reported that there were 4533 active and associate members including 714 "Welcome to Armor" lieutenants enjoying their first year of membership without cost to themselves. He noted that with nearly 10,000 Armor officers, and a much larger number of senior NCOs on active duty, more remained to be done to increase membership. In addition, several thousands of Army National Guardsmen and reservists who are not now members, are eligible for membership.

The paid circulation of **ARMOR** Magazine is about 1100 more than at the time of the 1967 Annual Meeting. **ARMOR** is expensive because of its small press run. The average cost of printing and distributing each copy is about 53 cents excluding administrative costs. This will go down dramatically with increased circulation.

[The financial reports which were published on page 3 of the July-August 1968 **ARMOR** were summarized.]

The Secretary-Treasurer explained that the \$2.00 Annual Meeting registration fee would just cover printing, postage and miscellaneous costs of the meeting and that all attending were sharing these costs equally through paying the fee.

The revised Constitution which appears elsewhere in this issue was adopted.

Colonel John R. Barclay, a member of the Nominating Committee acting for the Chairman, Major General A. L. West, Jr., then placed in nomination the name of Lieutenant General Willis D. Crittenberger to be Honorary President. Colonel Barclay noted that General Crittenberger was the oldest living former president of the Association and had served longer on the governing body than any current member. Following graduation from West Point with a Cavalry commission, General Crittenberger had served with troops and as aide to General James Parker at the time the latter served as fourth President of the Association. General Crittenberger served with the 1st Cavalry when it was our Army's pioneer mechanized unit. He was chief of staff of the newborn 1st Armored Division, commanded the 2d Armored Division, II Corps and III Armored Corps, and then the IV Corps in World War II combat in Italy. Thereafter, he commanded the unified Panama Defense Command, served as Senior United States member of the Military Staff Committee of the United Nations and commanded First Army until his retirement in 1952.

The nomination was seconded and General Crittenberger was elected by acclamation to be the second Honorary President since the founding of the Association in 1885.

Colonel Barclay then presented the Nominating Committee's recommended slate noting that General Waters who had led the Association during a year which had seen it modernized, vitalized and strengthened was being nominated for a second term as president. The vice presidential nominees included the Vice Chief of Staff

of the Army, the Commanding General of the Armor Center and an Army National Guard armored division commander. The 14 other elected Executive Council members included representatives ranging in rank from master sergeant to brigadier general nominee. These were from the Armor Center, Armor Branch, Combat Developments Command, the Pentagon, West Point, the Army Aviation School and two cavalry regiments.

The slate was placed in nomination, seconded and unanimously elected. [The new Officers and Executive Council are shown on the inside front cover.]

General Waters accepted the presidency and thanked the members present for the honor conferred upon him.

The meeting adjourned at 1200.

[Immediately thereafter, a telegram congratulating General Crittenberger on his election as Honorary President was sent to him. He returned his acceptance by telegram and expressed his appreciation to the members of The Association.]

THE EXECUTIVE COUNCIL MEETING

The old and new Executive Councils met at 0930, 12 May 1968. A quorum of the new Council was present.

Reports of the Investment Committee and the auditors were approved.

The Council reaffirmed the support of the Armor Association for the project to build the proposed new Patton Museum. The Editor of **ARMOR** was enjoined to publicize this endeavor whenever possible.

The Council discussed the "Welcome to Armor" program of free memberships for newly-commissioned Armor lieutenants. In view of the expense of the program, the low percentage (less than 20 percent) of those eligible who sent in their application blanks and the less than 17 percent renewal rate, it was voted to discontinue the program. [The program was discontinued on 30 June 1968.] In the future all officers attending the Armor Officers Basic Course and Armor NCO Candidates will be given free sample copies of **ARMOR** Magazine to acquaint them with the advantages of becoming regular readers.

A committee was appointed to study the dues and subscription price structure together with the Association's predicted financial situation and the anticipated **ARMOR** Magazine circulation for the foreseeable future. This committee is to recommend actions to ensure that income will meet expenses. It was noted that dues were last raised in 1950 and subscription prices in 1964.

The Council expressed unanimously its appreciation to General Hollis, Colonel Cobb and all others responsible for the very successful 79th Annual Meeting.

The meeting adjourned at 1130.

O. W. MARTIN, Jr.
LTC, Armor
Secretary-Treasurer

"KY BINH"

THE ARVN CAVALRYMAN

by Major Robert H. Burleigh

"Mot, hai, ba, bon, di!" The young Vietnamese cavalry lieutenant speaks these words over the radio and his troop of fifteen armored personnel carriers is instantly on the move. As is the case on most operations in the Republic of Vietnam, they are relatively unaware of exactly what awaits them as they move across the rice paddies toward their designated objectives.

At the same time several questions enter the mind of their American senior advisor—an Armor captain who has recently arrived in Vietnam and is embarking on his first combat mission with the armored cavalry troop. How will these small, slender soldiers react if and when they come in contact with the Viet Cong? Will they be aggressive? Can they be trusted?

As the thick dust from the now dry paddies rises from the tracks of the carriers and virtually covers everything and everybody, the captain thinks back to the numerous articles and editorials he read back in the States. Wiping the sweat from his forehead, he remembers how the journalists had contended almost unanimously that the Army of the Republic of Vietnam (ARVN) was not contributing its fair share to the war effort. He thinks back to

the claims made by some prominent correspondents that the officers and soldiers are incompetent and that they are afraid to close with and destroy the Viet Cong. And then there were the politicians with their accusations that ARVN was not pulling its weight on the rope of this tug-of-war conflict. All of these articles had greatly interested him—particularly after he had received orders assigning him to the United States Military Assistance Command, Vietnam. He realized then that he would be working with those people who comprised ARVN and that the more he could learn about them before his arrival in the country the better qualified he would be as an advisor.

And now here he is perched on top of an armored personnel carrier behind his counterpart, the Vietnamese lieutenant, and still wondering how they will react. Suddenly, the loud cracking of .50 caliber machineguns brings an abrupt end to his train of thought.

The lead platoon has engaged a group of Viet Cong. Its platoon leader spotted them running toward a woodline. The captain's counterpart is on the radio immediately, issuing orders to his troop at a furious rate.

As if by remote control, all the tracks begin to maneuver to bring maximum fire on the enemy. The troop's support platoon with its internally mounted 81mm mortars has already begun to deliver accurate fire on the woodline. The ARVN artillery observer attached to the troop is on his radio, presumably requesting additional fire support from his unit. The tracks of the line platoons are all on line and charging the objective. It is all the advisor can do to hold on as the command tracks follow in the attack, constantly maneuvering to positions where the troop commander can best control the action. It is at this point that the apprehensions of the American captain disappear. "These soldiers," he thinks, "are not just aggressive—they're little tigers!"

The above, of course, is a hypothetical situation; however, similar things are happening every day in the Vietnamese war. Having served as an advisor with the ARVN 10th Armored Cavalry Regiment for one year, I have been shocked (and usually outraged) by many of the comments appearing in some American publications concerning these soldiers and their fight against Communist aggression. Since my return from Vietnam, I have been somewhat disappointed in discovering that a large percentage of our citizens have accepted as gospel the accusations of these journalists.

I do not maintain that the entire Vietnamese army is an organization to be set up as an example for all to follow. It is just like any other army in the world today—it has its good units as well as the bad and the mediocre. Some of the soldiers are outstanding and some are poor. However, it appears that the American press, with some few exceptions, has chosen to concentrate the greatest number of column inches covering ARVN on the bad units and the inadequate soldiers. This is a gross injustice not only to the many honorable Vietnamese soldiers but also to the American people who have a right to know all of the truth. In all fairness, I must also point out that this article is based on the officers and men and the tactical operations of only one unit of ARVN—the 2d Troop, 10th Armored Cavalry Regiment.

The Vietnamese cavalymen with whom I was associated are an outstanding group of soldiers and a real credit to any cavalry unit. They are most proud of the fact that they are a part of the *Ky Binh* (Cavalry). They wear their black berets with a great sense of pride (as do the advisors) and are probably the cockiest soldiers in ARVN. They have every right to be proud because they are first-rate.



"... the troop never had over one carrier deadlined at any one time because of a mechanical failure." ▲



ARVN cavalry mounts ready to charge forth from sandbagged stalls. ▼





The CP—another example of doing more with less.

Once the advisors to the cavalry troop have established good rapport with the soldiers, they are considered part of the unit. The mutual respect is beyond belief. The advisor learns to share every joy and every sorrow experienced by the soldiers. When a trooper is injured or killed, he feels the same compassion for him as if it had been a member of a unit which he was commanding. Why? Because he is a part of that unit and the soldiers in it are



MAJOR ROBERT H. BURLEIGH, *Armor*, was commissioned from ROTC at Spring Hill College, Mobile, Alabama in May 1960. He then served as a platoon leader, communications officer, adjutant, and troop commander with the 3d Armored Cavalry Regiment at Fort Meade and in Germany. Following graduation from the Armor Officer Career Course in 1965, he commanded Troop B, 2d Squadron, 1st Cavalry in the 2d Armored Division at Fort Hood. In July 1966, he became the squadron executive officer. He next served in Vietnam as an advisor to the ARVN 10th Armored Cavalry Regiment where he was awarded the Bronze Star and the Vietnamese Cross of Gallantry with Silver Star. He is presently assigned to the G1 Section, Headquarters, III Corps, Fort Hood, Texas.

just as much his "comrades-in-arms" as they would be in an American unit. The men will not allow you to forget this. The advisor is continually reminded of it by their actions—their smiles, the pat on the back, the invitation to join in a volleyball game.

Prior to my assignment to Vietnam, I heard some individuals remark that many Vietnamese soldiers are cowards. Within our troop, I found that nothing could be further from the truth. To substantiate this I can cite a reaction mission which we were called upon to undertake on 14 August 1967 when the city of Tay Ninh came under attack. Mortar and rocket rounds began falling at approximately 0150 on the city's *Chieu Hoi* center. At 0158 our troop was on the move in the direction of where we thought the mortars were located. (Note that this is only eight minutes from the time the first round hit!)

During the operation, at 0250, the Viet Cong triggered an ambush of the troop. It was initiated by firing on and hitting a platoon leader's carrier directly on the gas tank. The platoon leader, a recently commissioned second lieutenant, received only minor injuries from the blast. Despite the intense automatic weapons and small arms fire, immediately he jumped from the damaged vehicle and ran to the track following so he could continue to command his platoon. As he attempted to mount that vehicle, an automatic weapon almost decapitated him.

At the same time, the troop commander and the troop medic dismounted from their APC's and ran to the burning track to pull the wounded from the vehicle and get them to safety. The burning vehicle exploded about five minutes later while the troop was still engaged with the Viet Cong. As a result of the actions of the commander and the medic, all of the soldiers on the burning vehicle were saved and the only fatality was the platoon leader who had attempted to continue commanding his platoon.

The Viet Cong lost four KIA (US body count) and one RPG7 captured. Two weeks later, a *Chieu Hoi* who had been involved in the action told authorities that approximately thirty of his group had been killed as a result of the troop's rapid reaction. For this action, the troop received commendations from both the Vietnamese Province Chief and the American Senior Advisor. These officials stated that without the aggressive show of force of the unit the province capital headquarters at Tay Ninh might have been overrun.

At Tay Ninh, a track was hit and destroyed but the entire crew were saved.



Something should also be said about the mutual professional respect between ARVN and US units. During our tour in Rach Kien, Long An Province, the troop habitually operated with the reconnaissance platoon of the 3d Battalion, 39th Infantry. After several operations, the battalion commander decided that he would give the reconnaissance platoon a well-deserved rest on one operation. The operations order designated a platoon from one of the line companies to be attached to us. Upon hearing this, the members of the reconnaissance platoon went to their lieutenant and informed him that if anybody was going with the ARVN 2d Troop, 10th Cavalry, it was going to be them. The operations order was subsequently amended and the reconnaissance platoon went with our troop on the operation. This pleased not only the American soldiers, but the Vietnamese as well. They were going on another operation with their friends.

Concerning the tactical ability of the troop, I can only say that the Vietnamese probably taught me as much, if not more, than I ever taught them. Their formations and their ability to maneuver quickly and adapt to new situations were outstanding. Every track commander without exception was quick to respond to orders. They were well-skilled in the complex art of guerrilla warfare and they had the knowledge and the foresight to deal with it. Many times I became convinced that they had a sixth sense when it came to detecting Viet Cong. They appeared to know instinctively where "Charlie" would be. Their methods sometimes seemed somewhat unorthodox by our standards. However, they were successful and who can argue with success—particularly on the field of battle.

A great deal of criticism has been aimed at ARVN's lack of maintenance consciousness. It is, however, illuminating to note that during my one-year tour the troop never had over one carrier deadlined at any one time because of a mechanical failure. Other operational shortages were the result of enemy action. In addition, failure to repair the vehicle was normally the result of a shortage of parts and not the inability or lack of initiative on the part of the mechanics or crew members. There was a tendency in the troop to neglect partially the wheeled vehicles and the individual weapons. Their philosophy on this was that it was more important to devote the greatest amount of time and effort to the tools of their trade—the armored personnel carriers and the crew-served weapons mounted on them. The latter were extremely well-maintained. On extended road marches, crew members habitually checked their vehicles from top to bottom at every halt. Following operations, the crew-served weapons were immediately dismounted for cleaning. However, only half of the troop's weapons were dismounted at any one time.

The Vietnamese cavalryman has been cheated by many who do not know him well. He has not been given what is due him. He is a brave, heroic soldier who is fighting to rid his country of Communism and to give his family and his friends the same privileges which we enjoy today. He is a proud man—proud of his country and proud of being a part of the *Ky Binh*. The Vietnamese cavalryman is proud of and feels honored to wear the symbol of his profession—the black beret. I was proud to be allowed to wear that same black beret. If I am again assigned to Vietnam, I hope to wear it again.



CAVALRY OPERATIONS

by Lieutenant Colonel Raymond R. Battreall, Jr.

Armored cavalry essentially as we know it today came into being in the early 1950s. World War II experience had indicated that cavalry units needed to be organized as combined arms teams completely capable of putting up a creditable fight as they spread out on reconnaissance and security missions. Thus were born the American Army's unique cavalry platoons with organic scouts, tanks, indirect fire support and riflemen. The doctrine for armored cavalry has been as flexible and mobile as armored cavalry is. And one finds that it is yet evolving. While there is consensus on some points, there is heated discussion on others. True cavalrymen are not neutrals. They are aggressive protagonists of their points of view.

The author of this article, Lieutenant Colonel Raymond R. Battreall is a true cavalryman and a long-standing ARMOR author. A 1949 West Point graduate, his first troop duty was as a platoon leader, troop executive officer and troop commander in the 14th Armored Cavalry in Germany. Subsequently from 1960 to 1962 he served with the 3d Armored Cavalry in CONUS and in Germany. In 1965 and 1966 he was an advisor to an ARVN cavalry unit. He is now again with the Regiment of Mounted Riflemen as a squadron commander.

This article and those to follow are based on a series of lectures Colonel Battreall addressed to his junior leaders. They contain little that is new or startling but they do cover the highlights of what all who aspire to successful cavalry command should keep continually in mind. And, in our opinion, they do this with a directness and verve not generally found in the doctrinal manuals. THE EDITOR.

The business of a Cavalryman is far more an art than a science

Assignment to armored cavalry is the most challenging and rewarding opportunity available to officers and noncommissioned officers of the combat arms. Nowhere else do junior leaders enjoy such freedom of action in employing their units. Nowhere else are the flexibility and power of the combined arms team found at such a junior level of command. On the other hand, nowhere is the burden of responsibility heavier on the junior leader.

Dispersion, mobility and flexibility make Cavalry units the most complex and demanding of all ground combat units to command. To a unique degree the successful accomplishment of your mission and the lives of your men depend upon you and you alone. When the time comes to run with the ball it won't do any good to look over your shoulder at the coach. He won't be able to help from the sidelines. It behooves each of us, then, to learn as much as we can about the rules of the game before it's our turn to carry the ball. And those of us who are in the position of coaches must do our jobs now, for tomorrow may be too late.

Now the business of a Cavalryman is far more an art than a science. Solutions to particular situations depend not only upon the classical factors of mission, enemy, troops, and terrain (METT), but also upon the personality, the drive, and the skill of the man who commands on the spot. He and he alone is responsible and must decide. No one can dictate rules to him. If his solution works it is good—no matter how unorthodox. If it fails it is bad—no matter how conventional.

Still, a great many Cavalrymen have been at the business for a number of centuries and out of their cumulative experience have come certain fundamentals and tricks of the trade. The more of these we can absorb and digest, the wider will be our range of choices when we are searching—alone and under pressure—for the right course of action in a given situation.

This article introduces a series in which we will examine various phases of cavalry operations—garrison preparation for field operations, marches and bivouacs, defense and delay, attack missions, security and counterreconnaissance, and reconnaissance. The remainder of this article will cover basic

factors which apply to all phases of cavalry operations.

Know your Mission No matter what the mission and no matter how urgent the need for quick action, you cannot possibly act with success unless you understand what is expected of you. Always ask whatever questions may be necessary to insure understanding. Far better to risk being thought thick-headed than to jump on your horse and gallop off madly in four directions at once, thereby endangering your men and the success of the mission.

Communications Always maintain communications with subordinates and with the next higher commander. This is basic. We could kill a man or a tank with every round of our basic load and still not decisively affect the course of a major campaign. But a single message from one of our scout squads can very well contain the information the corps or army commander needs to make vital decisions. This *will* affect the outcome of major campaigns, or even an entire war.

Therefore, if your radio fails, change position, change sets, use auxiliary antennas or put out relay stations. If this is necessary, do it. If you still cannot make contact, send a mounted messenger. If you have lost your vehicles, send a runner. If no one can run, then crawl, but *get the word back*. This is our primary reason for existence.

Communications *down* are as vital as communications *up*. A unit out of communications is a unit out of control. Only through continuously available, effective communications can we cover our wide sector and effectively use our firepower, mobility and flexibility.

A word is in order about getting the most out of communications once established. The rule should be that the desired condition on every net is silence. This may sound odd. But only when we eliminate all garbage and transmit only what needs to be transmitted will we be able to handle the required volume of necessary traffic. Cut out operator chatter and blowing in the mike. Listen before you talk. Once you have identified yourself use abbreviated calls. State your business in your initial call (e.g. "78 Oscar, this is 44 Oscar SPOTREP. Over"). The called station will then be prepared to copy a particular type of message when it answers.

Think before you mash the button. Use standard format whenever possible to insure completeness and clarity without wordiness.

When you think the conversation is logically over,

say "OUT." If the other guy has more he will say it anyway. Don't stand on rank on this point.

If you can't get an answer and your message is hot, send it anyway. It's surprising how often the other fellow does hear you but can't make you hear him.

Offer to relay whenever you can, but when you do, relay accurately. Write the message down.

Get the most out of your CP station. Whenever it exists, the CP is the commander's alter ego. It speaks with full authority for him both up and down. Furthermore, the CP is always positioned with communication as the primary consideration. It must be in contact with each subordinate and the next higher station. Only when his CP has these attributes can the commander be freed to move about the battlefield. If the CP does less than its full job, the commander quickly finds himself tied to a hilltop, unable to move.

Three more important points about the CP:

It must be aggressive in relieving the commander of personal communications responsibility. All but the most personal matters should be sent to the CP in the first place, there to be digested, acted upon, and passed up or down as necessary without prompting from "6." It should be SOP that the CP will answer for "6" whenever he fails to answer within 5 seconds of the second call for him. Naturally, the CP must monitor "6's" conversations and log them, both to keep up with the situation and to relieve him of keeping a log.

The CP must be both competent and be empowered to act as required by the situation with the commander's silence indicating his approval. This extends not only to receiving and rendering reports, but also to accepting and acting on changes of mission from above and to reacting as required by the developing situation in the absence of specific instruction from "6." In other words, the CP is not just a message center and relay station, but the *command post*—the dynamic nerve center of the unit's operation. It goes without saying that it must be manned by the very best people—hand picked for the job. This is the price the commander must pay for the freedom to go personally to the critical point in order to lead and influence the operation.

The foregoing points are doctrine. This next is a suggested technique. A clear distinction should be made between the CP and the remainder of the headquarters—orderly room, maintenance, kitchen, medics, and various supply vehicles from time to time. These seek concealment and good road nets

in order to do their jobs. These latter elements should be placed under the first sergeant who should be made directly responsible for feeding, supplying, and maintaining the troop. The CP, then, under the executive officer and consisting of the CP track, exec's jeep and essential security is free to hop from hilltop to hilltop (using the jeep radios for a "jump" capability) as required to maintain control of tactical operations.

Reports We exist to provide higher headquarters with information. What we learn is of no value if we keep it to ourselves. You must render the following reports *promptly* and *accurately*:

- Location report: On crossing phase lines and designated check points. Always report, but never stop unless specifically instructed otherwise.

- Situation report (SIT-REP): Hourly or as changes occur. Include:

Location

Current situation and activity

Summary of activity since last report

Vehicles and personnel losses and supply requirements

Your intentions

- Spot report (SPOTREP): Upon contacting enemy (Flash), seizing objective, receiving air or CBR attack, and any other emergency or unforeseen event. Include:

What you see (Be specific. Not "tanks," but "medium tanks.")

How many

What they are doing

Where they are

When you saw them

What you are doing about it

- Terrain and road report: Whenever you discover a feature which is not as shown on the map; whenever you encounter an obstacle (weak bridge, defile, etc.) on a main route which will not support medium tanks; or when called for. Include location, description, and availability of bypasses.

Contact The most dangerous thing we ever do is go out and look for an enemy when we don't know where he is. Therefore contact with the enemy, once gained, must be maintained *at all costs*. Observation of his movements (i.e. visual contact) is the minimum required. Even when your unit is ordered to stop, keep your scouts in contact and report your action to the next higher commander.

Supporting Fires Remember your supporting fires. Know how to call for and adjust them. Make full use of them. Common supporting fires are:

- Organic 4.2 inch mortar(s)
- Other 4.2 inch mortars within range
- The 155's of the howitzer battery
- Overwatching or indirect fire of uncommitted tanks
- Divisional or corps artillery within range
- Tactical air

Army Aviation Remember the help you can get from the regimental air cavalry troop or squadron aviation section. They can extend your observation, deliver critical supplies, evacuate serious casualties, move a patrol or small attack force, provide you an aerial CP, give you photos faster than the Air Force, and give you quick close supporting fire. Request this support through Squadron S3 Air.

Security

- Never allow yourself to be surprised from any direction. Maintain constant physical contact with friendly units on your flanks.
- Keep your people dispersed.
- Enforce blackout and noise discipline.
- Always keep .50 caliber machineguns manned and on air watch.
- Always have at least one man awake and alert on each crew-served weapons and combat vehicle.

Observation High ground is worth its weight in gold, not necessarily to fight from (the edge of a woods or town may be a better fighting position), but to observe and communicate from. There is no substitute for commanding terrain.

Information Gather information from every source: maps, observation, prisoners of war, civilians, enemy dead, materiel, documents and the ground itself. Never miss an opportunity to get and pass on information. Don't think you must have a specific recon mission or specific EEI before you need to pass on information. We never know enough of the enemy and terrain. Reconnaissance is always included in any mission assigned.

Decision Make decisions rapidly based upon your evaluation (estimate of the situation) of the best information available to you. Once you have decided what to do, do it with everything you have. A good decision made is better than a perfect one made two hours from now if you execute it with speed and violence. Never quit. Never let your men quit.

Mobility Mobility is the ace up the sleeve of cavalry units. We have armor protection, but pure tank units have more. We muster more firepower than most people realize. Unit for unit, we can more than outslug any infantry formation ever invented. But again, tank units outgun us. Mobility, however, we have more of than any other unit in any army in the world.

We must capitalize on this advantage by using our mobility in such a way as to multiply the effect of our firepower by bringing it to bear on the enemy faster than he thinks possible at an unexpected place or from an unexpected direction. We must also use mobility to multiply the number of our elements in order that we may cover the wide frontages which are characteristically assigned to us.

Mobility, however, is much more than the physical ability to move. It is a state of mind. Patton's Third Army had no more tanks and no less foot infantry than our other armies during World War II. Yet it is remembered as an armored army because of its lightning thrusts and deep encirclements. The reason is simply that General Patton was more mobile-minded than other army commanders.

We must constantly search for the opportunity to use the little used or "impassable" route. We must always be prepared to react suddenly and violently to any unexpected situation. We must be ready to bounce off of a pocket of stubborn resistance or roll with the punch of a determined thrust only to slip around a flank and hit the enemy from the rear while he thinks we are still demoralized in his front. In other words, we must think fast. If you can only think at 2½ mph, someone can use you—we can't.

More than this, we must be constantly alert to preserve our physical ability to move. Our vehicles will not move without maintenance or without gas. Even as the old Cavalry took care of its horses before its men, so we must take care of our vehicles first. Never let a crew eat or rest before they have checked their vehicle. Never miss a chance to refuel. If a tank needs only a teacup of diesel and the teacup is available, put it in. You never know when the next chance will be. If the teacup isn't available, then get on your next higher unit to make it available. Without fuel you walk.

Flexibility The combination of our numerous radios, our mobility, and our combined arms organization gives us the potential for great flexibility. But once again, flexibility is a state of mind. You have

many different building blocks. Don't always build the same house.

One mission may call for an organic platoon. Another may call for a platoon plus a scout squad. Still another may call for only riflemen. Get in the habit of tailoring your units to fit their mission.

Furthermore, flexibility involves willingness and ability to change quickly and without advance notice. One platoon may have a tiger by the tail while another twiddles its thumbs. Or you may be engaged in reconnaissance in one direction and be directed to move immediately a long distance in another direction to seize a bridge or to stop a breakthrough. Again we must think speedily or leave the Cavalry. But don't forget that it's possible to be so flexible that you're just plain sloppy. Flexibility is a vital tool, not a coverup for poor planning or flightiness.

Rest The average man can go without rest for about 72 hours. At the end of this time, though he may still be on his feet, his efficiency drops to an unacceptable level. We cannot, however, count upon being pulled out of action every three days for rest. We must, therefore, find a way to make rest possible while continuing to operate. It should be policy that every man who is not needed at the moment will be resting, regardless of the hour. This does not mean that other essentials can be neglected. It does mean that men will not be kept awake merely to impress inspectors or umpires. The following rules of thumb will maintain fighting efficiency:

- All men awake and alert:
 - During actual engagements
 - During morning stand-to
 - During movement forward of friendly lines
- Only required security (one man per crew-served weapon and combat vehicle) awake and alert during lulls in action and after maintenance has been accomplished and necessary foxholes, camouflage, and so on have been constructed.
- Only drivers, vehicle commanders, and rear-facing sentinels awake and alert during road movements behind friendly lines.

Estimate of the Situation Get in the habit of using this mental check list to insure that you consider everything.

- MISSION
- Situation and Courses of Action
 - Weather, terrain, and relative combat power
 - Enemy capabilities
 - Own courses of action

- Analysis of opposing courses of action. Analyze effect of each enemy capability on each of own courses of action.

- Comparison of own courses of action. Summarize advantages and disadvantages of own courses of action.

- Decision (who, what, when, where, how and why).

Operation Order Always issue orders in the following form to minimize misunderstanding and to insure that everything necessary is covered.

- Situation

Enemy forces: Situation, capabilities, indications

Friendly forces, mission, and location of higher, adjacent and supporting units

Attachments and detachments: Units attached to or detached from your unit by higher headquarters and effective time

- MISSION: State the mission of your unit.

- Execution: In first subparagraph, entitled "Concept of Operation," give summary of commanders tactical plan. In succeeding subparagraphs assign missions to each organic and attached unit. In the last subparagraph list coordinating instructions common to two or more subordinate units.

- Administration and Logistics: General items, supply, transportation, service, evacuation, personnel, civil affairs and military government, and miscellaneous

- Command and Signal

Signal instructions and information

Command posts, location of commander

The use of this form is not incompatible with mission-type orders. It is necessary under pressure to insure completeness and clarity. Any portion may be amended, of course, by a written or oral fragmentary order as required. A time-saving technique should be pointed out here. Whenever any commander is called to the next higher headquarters, his second-in-command should automatically prepare the unit for a new mission and, unless they are heavily engaged, assemble his subordinates so that they may receive the word directly immediately upon the commander's return.

This, then, has been an introduction covering certain fundamental considerations applying to all cavalry operations. Some more detailed techniques for specific types of operations will be treated in future articles.



SHORT, OVER, LOST or...TARGET

A range for firing novel ideas which the readers of ARMOR can sense and adjust. This is a department for the new and untried from which the doctrine of tomorrow may evolve. Items herein will normally be longer than letters but shorter and less well developed than articles—about 750 words maximum is a good guide. All contributions must be signed but noms de guerre will be used at the request of the author. ON THE WAY!!

AIR CAVALRY—QUO VADIS?

by Lieutenant Colonel Wilson C. Wooley

Since 1966 Armor has had an air cavalry squadron developed, field and combat tested. Yet it still appears that Armor as a whole has not accepted our newest, most debated unit at face value. The evolution of units is a slow process at best. However, we must recognize that, as the combat arm of mobility and decision, it is imperative that we be out front in this evolutionary process. We must move quickly to adapt the air cavalry capabilities to our present and future needs.

The fact is that we are lagging behind. If the initiative is not seized quickly we will find the doctrine, hardware, TOE slots and so on ad infinitum promulgated, fostered and captured by our sister branches. Should this materialize, then who can fail to see a spectre armed with two pearl handled pistols emerge and seek out those who failed to grasp the significance of the air cavalry to Armor?

The foregoing is a serious indictment and must be substantiated. At this late date there is yet to be developed an approved TOE after almost three years. Of the five air cavalry (granted four are in Vietnam) none have completed an approved ATP.

These are the major problems that exist now and will probably exist for some time to come since TOEs apparently require almost as much time to develop as does the equipment. Must we wait for these before our doctrine is formulated? This hypothetical question leads into a brief discussion of tactics and doctrine.

TT 17-37-1 almost made it through the mill but has been stopped because of new developments in

the organizational field. This manual is patterned after 17-36 and covers the basic types of tactical employment. It contains good, hard information that is needed to train properly an air cavalry unit.

Then too, how is air cavalry doctrine integrated into our overall concept for the tactical employment of the brigade and division?

First of all, let's not make the mistake of generalizing that the air cavalry unit is, and can be, successful only in stability warfare. Granted that there are arguments that slow, low flying vehicles won't be able to exist on the modern battlefield. And what about the Redeye or its equivalent in the hands of an aggressor? Did we stop developing the tank with the advent of the individual antitank weapon or scratch our battle plans and armor doctrine in view of the nuclear battlefield?

Hardly! We placed emphasis on flexibility, mobility, quick reaction, and sudden, violent execution. The air cavalry in its only *real* mission, reconnaissance and security, will provide the quick, hard intelligence that will permit our armor and mechanized units to do exactly what they are designed to do. Armor air cavalrymen are adamant in the belief that their unit is ideally suited for the R&S missions and will greatly complement the ground cavalry units in finding and fixing an aggressor force for the brigade and division commander.

As concerns security missions, the air cavalry must not be given the mission of providing a degree of security labelled "protect" or "cover" since this is beyond its capabilities. However, the degree of security described by "screen" is right down its alley. Therefore the current missions of armored cavalry ground units remain unchanged while the air cavalry can be employed to extend their capabilities

over larger areas. This greatly augments the commander's overall ability to react with his major maneuver elements.

Audacity, audacity, and again audacity will characterize the normal day-to-day operations of the air cavalry. One of the least appreciated and most underrated reconnaissance units is the air cavalry rifle platoon. Thinking in terms of tank and mechanized infantry battalions, this small unit appears on the surface to be an insignificant fly-speck. However, through detailed ground reconnaissance, it can find and fix the enemy and get these battalions into more fights than might comfortably be relished. All that is required is audacity on the part of the troop commander as he air-assaults his aero-rifle elements into suspect areas far in front of or on the flanks of friendly forces. But this takes more than just one major's strong stomach and quick mind. It takes the unhesitating support of the higher ground commander to capitalize quickly and execute violently with whatever forces are necessary. This mode of operation has been grasped and accepted by infantry and air assault leaders.

The employment of the air cavalry can be varied to suit the type of operation that the brigade or division is conducting. What of the mission of the air cavalry when the division is fully engaged? It is simply a continuation of the reconnaissance and screening mission on the flank or forward of the line of contact (LOC). In the latter case, the air

cavalry has the mission of detecting buildups and sealing off escaping units but stopping short of full engagement beyond the LOC unless the division is capable of penetrating to capitalize on any bridgehead established. The mech infantry, dismounted, can be air assaulted in increments to enlarge a bridgehead or harass the aggressors rear area. Dissipation of effort? Perhaps, but not when evaluated in terms of the probable outcome of the battle. Again emphasis is placed on Armor's mobility and flexibility regardless of the type warfare. Enough on tactics! There is much to be done as one can readily see.

In another vein, a great deal has been said about the proper mix of ground and air cavalry units. Indications are that what we have in the armored cavalry regiment is almost correct. However, here again air cavalry is a consideration. Not enough in the one air cavalry troop? Or is such a troop needed at all? Hopefully, the new TOEs, when published, will be based on combat results, demonstrated requirements and future needs. Would not an air cavalry squadron, in place of the troop, give the regimental commander a far greater capability to accomplish his mission and make his job easier without greatly increasing his span of control? A challenging thought? Yes!! But certainly not beyond our mobile, flexible, Armor minds.

Quo Vadis Air Cavalry? Forever in the bosom of Armor. Forever!

From The Armor Branch Chief...

NEW LOCATION FOR REVIEW OF OFFICER'S TAG FILES

The Armor Branch Chief has announced that the Personnel Records Division, Office of The Adjutant General moved recently from the Pentagon to the Melpar Building located at Carlyn Springs Road and Leesburg Pike (Route 7), Bailey's Crossroads, Virginia.

Officers may now review their records at either of two locations—in Room 1821 Tempo A, 2d and V Streets, S.W., Washington, D.C. 20315 or at the Melpar Building. A minimum of 48 hours advance notice is required to permit review at Tempo A. No advance notice is required at the Melpar Building.

Officers desiring to review their files while they are in the Washington area should contact Armor Branch (Telephone OXford 68529 or 68730) prior to their arrival so that an appointment may be made to insure that the officer's records are available for review.



GENERAL WATERS PRESENTS AWARDS

In an impressive ceremony at West Point's historic Trophy Point, General John K. Waters, United States Army—Retired, 22d President of The United States Armor Association, presented engraved officer's sabers to Lieutenants Robert C. Kelly, Jr., and William L. Marsh. These saber awards are given annually by the Association to recognize the two top Armor graduates of the United States Military Academy and the two outstanding Distinguished Military Graduates of the Army Reserve Officers Training Corps.

SECOND LIEUTENANT ROBERT C. KELLY, Jr.

Lieutenant Kelly (below left) stood 26th in the U.S.M.A. Class of 1968 having been on the Dean's List for three and one-half years. His initial assignment is to the John F. Kennedy School of Government at Harvard University where he will pursue studies in political economy and government. He entered the service from Detroit, Michigan.

SECOND LIEUTENANT WILLIAM L. MARSH

Lieutenant Marsh (below right) stood 28th in the U.S.M.A. Class of 1968. The son of the late Colonel W. L. Marsh, Armor, he entered the Military Academy on a Presidential appointment having served as an enlisted man. Lieutenant Marsh is assigned to the 3d Squadron, 3d Armored Cavalry Regiment.





ARMOR SCHOOL TRENDS

COULD ARMOR SCHOOL INSTRUCTION BE BETTER?

The Armor School makes every effort to produce graduates who meet the needs of field commanders. To gauge success post graduate questionnaires are sent to graduates and their commanders. Returned questionnaires are evaluated thoroughly. When comments indicate a clearly established need for course revision changes are made in the POI, in the presentation, or both.

Currently a postcard pre-addressed to the school is put in the student's record jacket at graduation. This card requests the adjutant of the unit to which the graduate is assigned to fill in the graduate's address and return the card.

Four to six months after the student has been working in the field for which he was trained at the Armor School a questionnaire is sent to the graduate and his commanding officer. This asks the graduate for his appraisal of the course in preparing him for the job. The commander is asked to evaluate the proficiency of the graduate in performing the duties for which he was trained. Suggestions and recommendations for improvement of the course are requested from both the graduate and his commander.

The returned questionnaire is a clear-cut opportunity for graduates and their commanders to improve the effectiveness of Armor School instruction. However, less than 20 percent of the questionnaires are returned to the school. Many more are needed to provide an accurate sampling. Help the school to help you and Armor. Get the questionnaires back promptly.

All unit commanders' and graduates' ideas, suggestions and recommendations are welcome whether or not they receive a questionnaire. These should be sent to the Director of Instruction, US Army Armor School, Fort Knox, Ky. 40121

VIETNAM PACKETS

Officers and NCOs on orders to Vietnam are encouraged to write The Director, ISD, US Army Armor School, Fort Knox, Ky. 40121 for their free orientation packet. Included in the up-to-date material is an Armor leaders guide, communications lessons learned in Vietnam, examples of armor employment in Southeast Asia and several useful pamphlets on the area and its peculiarities.

NEW TRAINING LITERATURE

The Armor School has prepared draft Southeast Asia (SEA) oriented appendices to Army Training Programs (ATP) and Army Training Tests (ATT). These are not presently scheduled for Army-wide distribution but will be made available for units alerted for movement to SEA.

Items peculiar to operations in Vietnam are emphasized. Authorized modifications to tank crew gunnery tables permit closer engagement ranges and substitution of antipersonnel (beehive and cannister) ammunition for some armor defeating rounds. Offensive exercises have been revised to include strike, reaction force and route security operations. Defensive exercises stress perimeter defense and base camp operations. The scope of night training has been greatly expanded and it is prescribed for each type operation. SEA oriented appendices have been prepared for the ATPs:

- 17-35, *The Tank Battalion*;
- 17-37, *The Tank Company*;
- 17-51, *The Armored Cavalry Regiment*;
- 17-105 (17-55), *The Cavalry Squadron*; and,
- 17-107, *The Armored Cavalry Troop*.

ATTs have been set in a SEA environment and require the tested unit to undertake operations which after-action reports have indicated to be typical of Vietnam combat. ATTs for which appendices have been prepared include those of the same number and title as the ATPs above plus: 17-37-1, *The Tank Platoon*; and, 17-107-1, *The Cavalry Platoon*.

M60A1E2 TRAINING BEGINS

A new equipment training course on the M60A1E2 tank recently was instituted at the Armor School. Designed for operators and organizational maintenance people, the course is being taught by instructors for the Army Weapons, Missile, and Munitions Commands and from Frankford Arsenal.

The course is to prepare instructors and key field personnel for the time when the M60A1E2 tank will become part of the weapons inventory.

The six-week program covers the fundamentals of the turret, the tools and testing equipment, the gun/launcher and mount, and the commander's cupola control system. Eight classes are planned.

Students for the first class came primarily from the Weapons Department of the Armor School and the Army Training Center at Fort Knox. Students slated to attend future classes will come from Fort Hood, US Army Europe, the Combat Developments Command, and the Test and Evaluation Command.

NEWS NOTES



ARMOR OFFICER WINS PACE AWARD

Lieutenant Colonel Stan R. Sheridan recently received one of the Sixth Annual Pace Awards in a ceremony at the Pentagon from Mr. Frank Pace, Jr., Secretary of the Army from 1950 to 1953. The award was created in 1963 by former members of the Army Secretariat who served under Mr. Pace and is designed to recognize an Army Staff officer and a civilian who have made outstanding contributions to the Army during the previous year. The Pace Award, a scroll and pen set, is given for completing a great improvement in service, a substantial financial savings or a significant technological or military development. LTC Sheridan, of the Combat Materiel Division, Office, Chief of Research and Development, Department of the Army, supervised all matters in that office related to Army research and development activities for tanks. This responsibility, totaling twenty separate projects, included all major systems which are combined into a complete tank. LTC Sheridan, who is from Washington Court House, Ohio, is a graduate of the United States Military Academy, Class of 1951, and holds a Master of Science Degree in Mechanical Engineering from the University of Southern California.

ARMOR UNIT HISTORIES

The Armor Association reference library is sadly lacking in armor unit histories of World Wars I and II, Korea and Vietnam. Donations are tax deductible and will be acknowledged with real appreciation.

WHITE HOUSE FELLOWSHIP

Of the two Army officers named to be among the 19 White House Fellows for 1968-69, one is Armor Major John W. Woodmansee, Jr. A 1956 USMA graduate who holds a Master of Science degree in public administration from George Washington University, Major Woodmansee has been an assistant professor at West Point for two years. The White House Fellows are selected from among young professionals in many fields nationwide. Each serves as an assistant to the Vice President, a member of the White House staff or a cabinet officer for a term of one year beginning in September.



AOAC 2 HONOR GRADUATE

Captain Warner D. Stanley, III, Distinguished Graduate of the 1968 Armor Officers Advanced Class Number 2 is congratulated by Lieutenant General Jonathan O. Seaman, Commanding General of First U. S. Army. Captain Stanley holds the sterling silver Revere Bowl presented to the top graduate by the United States Armor Association.

REPRINTS OF OLD MANUALS

Reproductions of some out of print Army field and technical manuals are available from the National Archives and Records Service, General Services Administration, Washington, D.C. 20409. Photocopies are 10 cents a page and 35mm microfilm copies two and one-half cents a page.



NEW ARMOR CENTER COMMAND SERGEANT MAJOR

A former Fort Knox first sergeant has taken over the post of the Armor Center command sergeant major. CSM William H. Strickland was last command sergeant major of the 4th Armored Division in Germany. From 1956 to 1959 he served as first sergeant of the 22d Tank Company and Company D, 33d Armor at the Home of Armor.

The 41-year-old armor leader has completed 24 years service. Fifteen of these have been spent overseas. CSM Strickland saw action in both World War II and the Korean conflict. During two tours in Korea he was assigned to the 1st Cavalry Division. He attained the rank of sergeant major on 28 February 1962 and was among the first to be designated a command sergeant major.

"OLD BILL" STILL REGULATION

Cavalrymen and tankers have long had an affinity for mustaches. At times such hirsute adornment has had official sanction and at others there has been a total lack of current official pronouncement on the subject. The first reference on this that ARMOR has found is War Department General Order No. 25 of July 1848 which stated: "The hair to be short, or what is generally termed 'cropped'; the whiskers not to extend below the lower tip of the ear and a line thence with the curve of the mouth. Moustaches will not be worn (except by cavalry regiments) by officers or men on any pretense whatever." Now after a long silence on this matter, AR 600-20 announces: "The hair will be well groomed, cut short or medium length, and neatly trimmed at all times. The face will be clean-shaven, with the exception that a neatly trimmed mustache is permitted." Both directives cited are the poorer for not having illustrations of authorized and proscribed models.

ARMOR AUTHOR RECOGNIZED

Dr. M. G. Bekker of the General Motors AC Electronics-Defense Research Laboratories and ARMOR author has been presented, in Stockholm, the Swedish Royal Military Technical Association's professional achievement award for his pioneering advancements in off-the-road research and articulated vehicle concepts.

Bekker, whose mobility concepts for vehicles have been adopted for rough terrain of Earth and proposed for extraterrestrial travel as on the lunar surface, is largely responsible for modern articulated vehicles concepts. One of these is now standard equipment in the Swedish and Norwegian armies.

Prior to joining General Motors in 1960 Bekker was chief of the U.S. Army Ordnance Tank-Automotive Command's land locomotion division which he founded. Earlier Bekker developed military vehicles for the armies of Canada, France and Poland.

Bekker's award was the second ever to be presented to a foreigner by the Swedish Royal Military Technical Association. A few years ago the first was awarded to Richard M. Ogorkiewicz, noted author and lecturer on armor at the University of London. Ogorkiewicz has authored over 40 articles for ARMOR.

HORSE TO HELICOPTER

Master Sergeant Horst W. Schroeder is in Vietnam for his third war with the 1st Cavalry Division.

With 25 years of military service, Schroeder said that he had intended to retire. "But, when I found that I could come to the 1st Cav, it had to be."

Shortly before World War II, when cavalrymen rode horses around the division station at Fort Bliss, Schroeder was assigned to a reconnaissance section. Shortly thereafter, the horses were phased out.

"It sure hurt a lot of these old troopers to see the horses go," he remembers.

During World War II, he was part of the Cavalry force that made the initial assault on the Admiralty Islands. Later he helped make up the Flying Column that assaulted into the Philippines (ARMOR, March-April 1967). He served with the Division when it moved into Korea.

Since he has been in Vietnam, Schroeder has been the operations sergeant for the 1st Battalion, 5th Cavalry his World War II and Korean War regiment.



▲ One of the three ACVs of the Armor experimental unit in Vietnam comes ashore after completing a patrol in the Mekong Delta region. Now working with the 9th Infantry Division the ACVs are capable of speeds up to 70mph. Mounted weapons include two .50 caliber and two 7.62mm machineguns and a 40mm grenade launcher.



▲ NEW ANTITANK WEAPONS

A one-man, recoilless antitank weapon of throw-away type, the "Miniman," has been developed by Sweden's National Defense Industries. Reported to be the only one of its kind in the world, the launcher has a firing range of up to 250 meters and can penetrate armor 340mm thick. The weapon weighs only 5 pounds, has a length of 35½ inches and is equipped with a barrel of fiberglass—"reinforced" plastic. It is pre-loaded and fires only one shot. When cocked, it is immediately ready for action. After firing, the soldier discards the barrel. The design of the sights, firing mechanism and shoulder piece allows quick aiming and firing in all positions, according to the Swedish Army. The barrel, the rear of which is formed as an open venturi, houses an aerodynamically stabilized HEAT shell with a hollow charge and a combustion chamber assembly. The firing mechanism is mechanical. The muzzle velocity is 160 meters per second. The practical range is 250 meters against stationary targets and 150 meters against moving targets. The 74mm HEAT shell with piezoelectric base fuze has an explosive filling of octol and weighs about two pounds.

NO MORE MUD AND DUST!

The U.S. Army Combat Developments Command is currently studying plans to provide better ground mobility by rapid soil stabilization and dust control.

Realizing that present and future concepts of land and air operation are predicated on rapid reaction and high mobility for military forces, the CDC planners are seeking means to increase rapidly the stability of soil to support foot troops, animals, vehicles, weapons and aircraft in most land areas and under varied environmental conditions. The system should treat the surface sufficiently to retain its stability when wet, and when dry to suppress and control dust.

DUAL PURPOSE LIFE PRESERVER

The first floatable armor vest capable of stopping .30 caliber armor-piercing projectiles has been developed by the Norton Company's Protective Products Division and the U.S. Navy Clothing and Textile Research Unit.

The boron carbide composite vest is encapsulated in polyethylene foam to make it float. It not only floats, but gives buoyance to the user, acting like a bullet-proof life preserver. The boron carbide armor composite developed in 1965 is the lightest weight material known capable of stopping .30 caliber armor-piercing ammunition. It is widely used on helicopters and by air crew personnel. Heretofore it was not floatable and a man wearing it could face the danger of drowning if he went into deep water. Potential uses for the floatable vests include protection for the crews of ACAVs, ACVs, helicopters, Sheridan tanks and amphibious assault vehicles. ▼





How Would You Do It?

US ARMY ARMOR SCHOOL PRESENTATION

SITUATION

You are the Commanding Officer, Co A, 2-4 Armor, currently located in Vietnam. You have been informed by the battalion commander that your company will be detached from the battalion and attached to the 2-21 Infantry for future operations.

The battalion commander realizes that the combat service support elements organic to your company will not be sufficient to support you while attached to the infantry battalion. Your battalion commander directs you to furnish the battalion S4 a list of the combat service support elements you will need, over and above that support normally supplied by the battalion SOP, to include equip-

ment and vehicles, so that he can make this support available to you. You return to your CP and, with the executive officer, begin your planning to determine your combat service support requirements. The battalion SOP states that detached units will normally receive a class III vehicle, a class V vehicle, a company mess team, and an aid and evacuation team.

PROBLEM

Realizing that the normal attachments provided by the battalion SOP for detached units will not be sufficient to support you during your attachment to the 2-21 Infantry, what additional combat service support assets would you request from your battalion S4?

AUTHOR: CPT T. L. MAY

ILLUSTRATOR: GARY A. COOK

SOLUTION

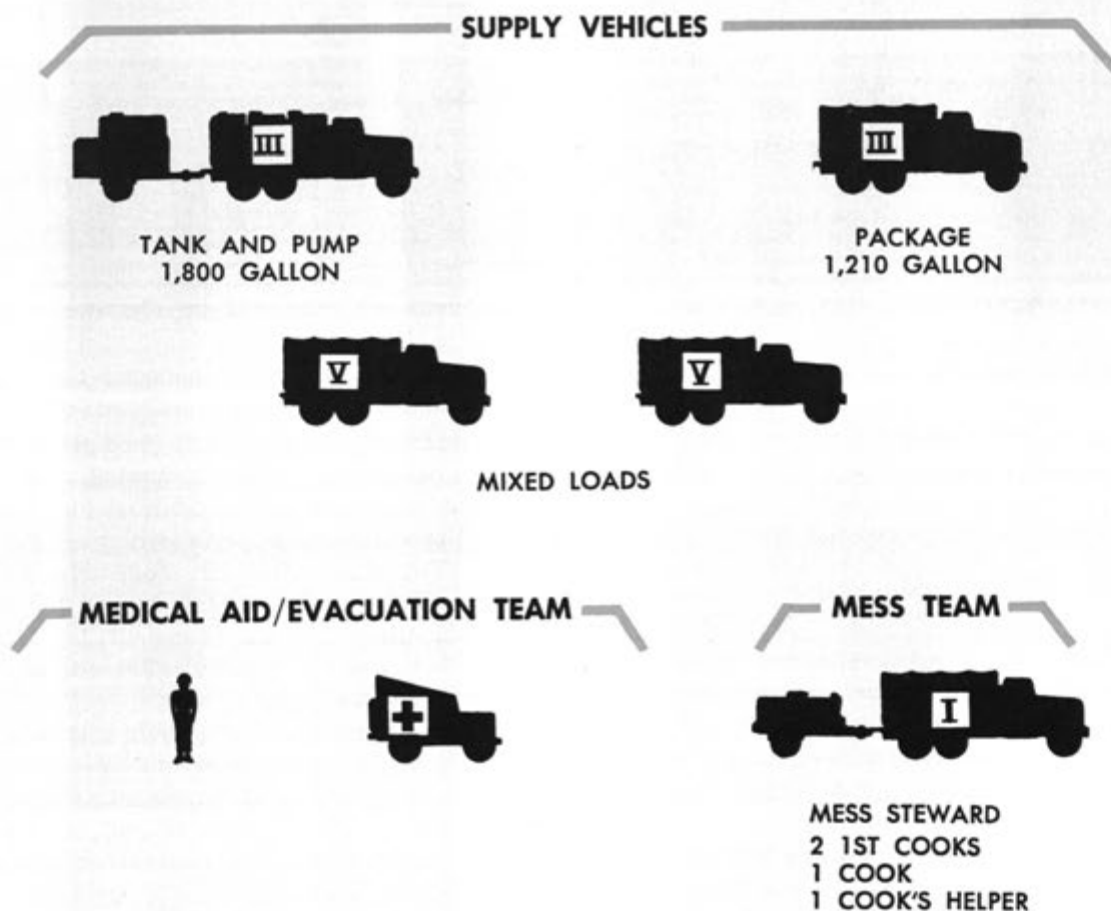
Having determined that the SOP support provided detached units would be inadequate in this attachment to an infantry battalion, you should have requested that the battalion provide you with an additional class III vehicle, a second class V vehicle, and a supply of fast-moving repair parts. Upon departure for the 2-21 Infantry, Co A would have the following battalion combat service support elements attached: two class III vehicles, with a mixed load of diesel and MOGAS; two class V vehicles, with a mixed load of ammunition, such as caliber .50, caliber .45, 7.62-mm, 40-mm, pyrotechnics, and a preponderance of canister rounds for the main gun; a company mess team; an aid and evacuation team; and a supply of fast-moving repair parts.

SOLUTION DISCUSSION

An infantry rifle battalion has 3 class III vehicles and 5 class V vehicles to support its own elements; therefore, it is not logistically equipped to provide support to attached armor or mechanized units. Accordingly, you would be justified in requesting additional class III and V vehicles to provide your unit continuous and adequate logistical support during the period of attachment.

A company detached from its parent battalion and attached to another normally is accompanied by a proportionate share of combat service support elements of the battalion. Attachments normally include ammunition, fuel and lubricant supply vehicles, a company mess team, and a medical aid and evacuation team. Additional medical aidmen and equipment and a supply of fast-moving repair parts may be provided the detached unit.

SUPPORT OF DETACHED ELEMENTS



FROM THE BOOKSHELF

FORTS OF THE UPPER MISSOURI

\$7.95

by Robert G. Athearn. 340 pp. Illustrations

At a time when the United States is preparing to launch a manned rocket to the moon and has over half a million men fighting a bitter war on the other side of the world at the end of a 10,000-mile life-line, one might wonder why a military man should give a second thought—or even a first one—to a book like this, and why a service journal should devote space to a critical analysis of it. Strangely enough, there is ample justification beyond the antiquarian taste of the pensioner or the supplementary profit of the book department.

National misapprehension concerning a "Great American Desert" west of the Mississippi, coupled with the search for a water route (Northwest Passage) to link the oceans and the Lewis and Clark decision to follow the Missouri River into the wilderness, all assured that watercourse of its early distinction as a prime artery of westward expansion. Commerce involving not only American but Indian and British interests created the need for trading posts. Protection against hostile Indian inhabitants of the river region raised the complementary requirement for military posts. As white passage through and settlement in their area posed a threat to their way of life, the Indians grew increasingly belligerent, and a military defense system was developed along the Upper Missouri.

This book traces the development of both trading and military posts—Forts Randall, Thompson, Sully, Pierre, Bennett, Rice, Bismarck, Lincoln, Clark, Stevenson, Berthold, Buford, William, Union—and develops the interrelationship between the commercial and military spheres, the citizen and soldier, the soldier and Indian. It is a tale with some familiar overtones through the generations: of inadequate appropriations, manpower, and supplies; of the boredom and demoralization of frontier service; of the separate worlds of home front and field; of clashes between official agencies; of rivalries between officers; of the victimization of a minority group. Yet above all it is a story of irresistible progress despite obstacles and because of individual and group perseverance, imagination, energy, courage, heroism.

In this sixth decade of the 20th century we hear much of guerrilla warfare, pacification, sanctuaries, search and destroy operations, the enclave strategy. Operations along the Upper Missouri a century ago are by no means as unconnected with today as time and space, technology and techniques might suggest. Indian warfare was guerrilla warfare. Garrisoning posts in the heart of Indian country along the Upper Missouri was an enclave strategy, and it soon became apparent to department and field commanders,

as Athearn's account makes clear, that the only way to deal with the hostiles was through search and destroy operations such as those conducted by Generals Sibley and Sully in Dakota in the Civil War years. Canada served for a time as a sanctuary for some bands. But it was the inhospitable terrain, which the Indians were adapted to and used to great advantage, that was the serious obstacle for an army cut loose from civilization, unable to live off the land, and faced with logistical problems of some magnitude and complexity which the use of river steamers only partially alleviated.

As a story of how another generation of soldier dealt with guerrilla warfare, carried on a revolutionary development and pacification program, established a defense system that became a "picket line of civilization" and contributed to the opening and settlement of the upper plains and the Rockies, *Forts of the Upper Missouri* has far more for today's military man than might at first glance seem to be the case.—William Gardner Bell

MILITARY UNIFORMS OF THE WORLD IN COLOR

\$4.95

by Preben Kannik. English edition edited by William Y. Carman. 278 pps. Illustrations

Here at last is the book for those who have looked longingly at the many splendid specialized works on uniforms ranging in price from \$8.95 to upwards of \$25.00. The 129 full-color plates illustrating 512 different uniforms, ranging from The Swiss Guards in 1506 to the Royal Palace Guard of Thailand in 1965, are alone enough to commend this superb volume. But then there are also fact-filled descriptions of each uniform which give one a good grasp of the setting in which the particular martial attire was worn. The section on military terminology should do much to restore accuracy in writing on military matters. Colonel Frederick P. Todd, the former director of the West Point Museum and himself a leading authority on military equipage, has written of this guide "a work of considerable erudition, in both text and pictures."

While the emphasis is on the more colorful dress garb, many of the modern field uniforms are represented. However, one is disappointed to note the omission of the World War II and subsequent American, British, German and other armored troop's coveralls and headgear. The Danish printer deserves commendation for the quality color work, the excellent proofing, attractive binding and generally pleasing look and feel of this fine book.

OWM, JR.

WAR IN THE DETERRENT AGE**\$6.00***by Major General D. K. Palit. 216 pp.*

In a day when American military analysts concentrate only on the extremes at either end of the spectrum of conflict, it is particularly refreshing to find such a current and comprehensive analysis. Major General Palit is one of the first writers to have taken the old perspectives and principles of war, integrated them with the more current enigmas of the nuclear and thermonuclear age, and produced a perspective of use to all of us.

Although he covers the rather common aspects of strategic deterrence—"counterforce," "counter value," etc.—it is his extension to the strategy and tactics of tactical nuclear warfare that is unique at this time.

His thesis is "to suggest that the establishment of a balance of deterrents in nuclear strategy does not necessarily create a historical condition in which other forms of war become outlawed." He supports this thesis well. This book warrants, and requires, both study and thought.

In supporting his thesis, General Palit addresses many tones of the spectrum of conflict more thor-

oughly than most authors—particularly those who can see nothing of consequence between all-out thermonuclear war and a jungle hunter-killer counterinsurgency operation. Particularly rare is his realistic appraisal of the needs for tactical nuclear power as an effective and destabilizing option in some situations.

For those considering a preliminary study of nuclear strategy and tactics, this is an excellent first step. For those who have read a great deal and are a little jaded, General Palit's analysis is suggested for some new insights. For anyone concerned with warfare at the mid-intensity levels, this book has much to offer.

As attention concentrates on India as a focal point in the discussions of the nuclear non-proliferation treaty, it is interesting to note that Major General Palit is a division commander in the Indian Army. As such, his view of the Chinese threat is particularly interesting and instructive. Most professional military analysts will be rewarded by exposure to General Palit's concise analysis of some of the world's knottier but comparatively neglected problems. (If you are not a "military analyst"—you probably would not have read this far.)—M.P.R.

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A FOOTNOTE

Last Reflections On A War by Bernard B. Fall (reviewed in *ARMOR*, January-February 1968) was compiled by Doubleday editor Stewart Richardson and widow Dorothy Fall. While screening the late Dr. Fall's unpublished material they found a manuscript "Street Without Joy Revisited" in his personal belongings which were returned from Vietnam after his death there while accompanying the Marines in combat. They were unaware that this draft article had been sent to Fall for comment by the author, Major (then Captain) Edward J. Laurance, prior to its publication as an article in the March-April 1967 *ARMOR*. Doubleday has announced that subsequent printings of *Last Reflections* will retain the chapter and give full credit to its true author and original publisher. It is interesting to note that those who knew Dr. Fall's style and views well considered Laurance's excellent piece to be of such quality that it deserved publication in the literary last testament of the renowned author of a number of excellent works about Vietnam and its conflicts.

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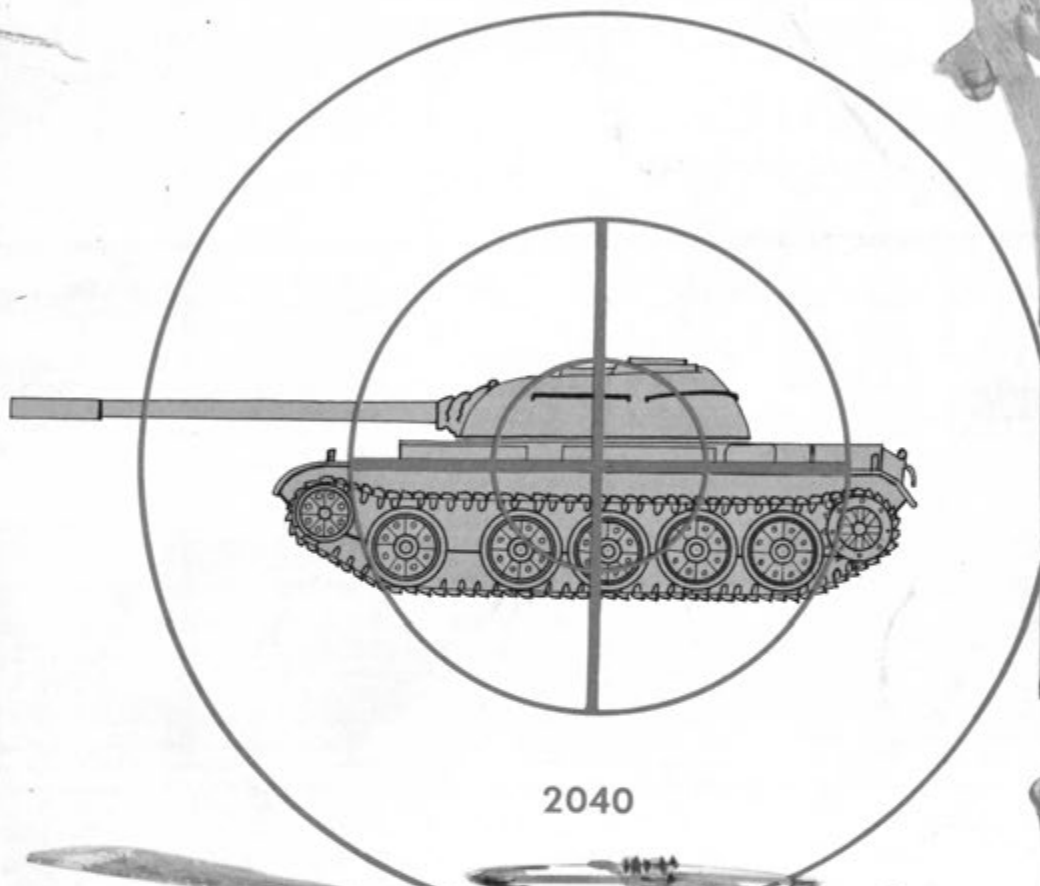


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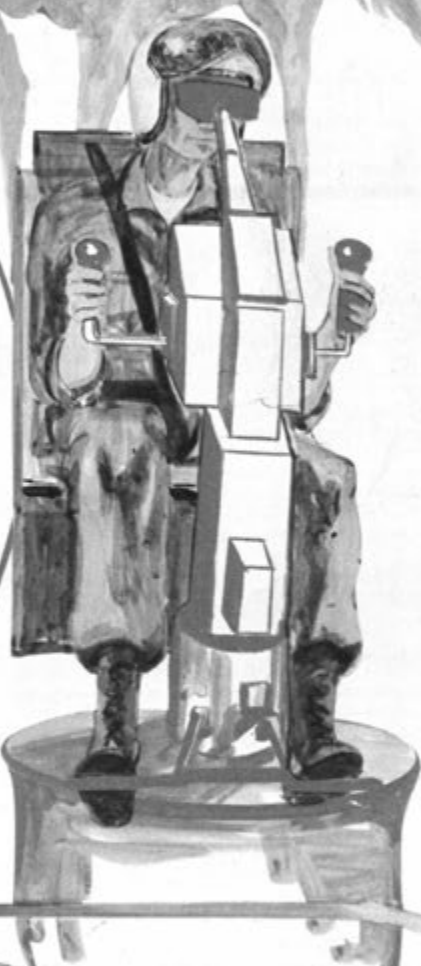
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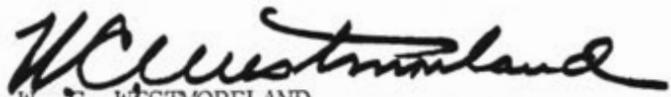
TO THE OFFICERS AND MEN OF ARMOR

In observance of Armor's 192d Anniversary, I extend congratulations and best wishes from the men and women of the United States Army.

Throughout the history of our country, the men of Armor and its predecessor Cavalry, whether on the plains of Kansas, on the deserts of North Africa, or in the jungles of Vietnam, have distinguished themselves by their skill and valor in combat.

You can be proud of your contributions to the Army team's achieving its past objectives and the advances it is making toward its present goals. Through your professional application of the military characteristics of mobility, firepower, and shock effect, you have continuously demonstrated that you have earned the right to be called "The Combat Arm of Decision."

As you look forward to another year of service, the men and women of the Army join me in expressing pride in your present competence and past achievements and in wishing the men of Armor success in the challenges of the future.


W. C. WESTMORELAND
General, United States Army
Chief of Staff

ARMOR

The Magazine of Mobile Warfare

Volume LXXVII

November-December 1968

No. 6

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COVER

A MONTAGE DEPICTS SOME OF THE MAJOR FEATURES OF THE AH56A CHEYENNE BEING BUILT BY THE LOCKHEED-CALIFORNIA COMPANY FOR THE US ARMY. VERSATILE FIREPOWER AND FLIGHT AGILITY ARE REPRESENTED BY THE AH56A FIRING SOME OF ITS WEAPONS. THE COMPUTERIZED FIRE CONTROL SYSTEM AND ANTITANK CAPABILITY ARE SYMBOLIZED. IN THE BACKGROUND "OLD BILL", A CAVALRYMAN OF YESTERYEAR, SURVEYS A MODERN DESCENDANT.

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LETTERS TO THE EDITOR



ARMOR Collection Available

Dear Sir:

I have copies of The Cavalry Journal and *ARMOR* complete from June 1940. I would be willing to donate this collection to an interested organization.

PAUL L. PETTY

Captain, AUS-Retired (Cavalry)
West Shore Road
South Hero, Vt. 05486

The Readers Write

Dear Sir:

Enclosed are changes in my military status and a check for two year's dues.

I would like to take this opportunity to send along some unsolicited reader opinion. It is gratifying to note that errors in grammar and spelling (whether typographical or not) which were rather incongruous in such an attractive publication have undergone a significant decline.

I am especially pleased with the numerous articles on Armor employment in Vietnam and with the prize-winning student articles from the Armor School. Congratulations also on going out and soliciting papers on currently topical issues such as that by Colonel Wallach on the Arab-Israeli War. The "Short, Over, Lost or Target" department is a welcome addition.

But, at the risk of sounding like an old curmudgeon, I must say that articles by and for the ladies seem to me to have no justifiable place in "The Magazine of Mobile Warfare."

One department which has been missing from *ARMOR* for a long time is the in-depth reviews of important military books. I miss these and hope to see their return, providing enough other members are similarly inclined.

In closing, let me congratulate you on the continuing high quality of the magazine. For many of us in the reserve components *ARMOR* is one of the leading contacts with what is current in the active establishment. So, keep up the good work.

RICHARD W. WATSON, JR.
MAJ, Armor
NJARNG

Plainfield, N.J.

Dear Sir:

Enclosed is a book order for a title not listed in the July-August 1968 *ARMOR*. Can the Book Department furnish this book?

Additionally, I would like to put forth a suggestion. It occurs to me that we (*ARMOR* staffers and readers) can do a significant service to ourselves by bringing about an expanded book review section. Reviews should be solicited on any book of military, political and social importance to today's officers and NCOs. Such reviews will stimulate interest in books recommended in *ARMOR* and they will acquaint the readers with books which can expand their awareness of those not strictly military considerations which affect our profession. I would be happy to be placed on a reviewer assignment list should you favor this proposal.

Thank you for bending an ear. The improvements in the content and layout of *ARMOR* are most impressive.

GORDON T. BRATZ
MAJ, Armor

Amherst, Mass.

Dear Sir:

"Promptness begets promptness" should certainly be the motto of *ARMOR* staffers. Their speed and efficiency is both remarkable and commendable. In only two week's time from my initial request for information, I actually have my membership card in hand. That's quite a record!

ROBERT E. HONERCAMP
CPT, Armor

While all appreciate the favorable comments in the foregoing letters, we of your ARMOR staff have not invested in new and larger hats. Too much remains to be done and we know it. With your help, ARMOR will become better and better. We are trying to increase both the scope and value of the book review section. Reviewers are needed. Send your volunteer statements to the Editor with brief comments on your interest fields and qualifications. Speaking of books, our Book Department can supply quickly any book published or wholesaled in the United States. Two readers have expressed reservations about the articles by and for the ladies. Many more have voted "yea." So long as better than two-thirds of the members' checks for dues are signed in a delicate hand, so long do we intend to do a little something to recognize our gals who wear a yellow ribbon for their troopers. Hell hath no fury . . . and besides, we love 'em all.

THE EDITOR.

From A Marine Tanker

Dear Sir:

I have just read Captain Robert Serio's article "The Sheridan" in the July-August *ARMOR*. It is well done and informative. I read of his death feeling that Armor has lost an exponent of depth and skill.

In the article was what surely was an inadvertent error. The M4 tank was not a 28-ton vehicle as stated but ranged in weight from 33.68 tons to just over 37 tons depending on the model. The frontal armor of homogeneous plate and castings was 2 inches depending on the slope plate and 3 inches on the turret. All M4s were welded rather than riveted.

Having cut my tanker's teeth (and my chin going from 3d to 2d) in the M4, I felt I just had to make these hopefully helpful comments on a great article.

Thank you for a fine magazine. I am hoping to see the Association grow and prosper further.

GERARD W. HODUM
GySgt, USMC

2d Tank Battalion FT
Camp Lejeune, N.C.

Remembering the M4 well and having checked the references, we agree with your data. Our chin is still OK but our face is red.

THE EDITOR.

The Spirit Is What Counts

Dear Sir:

As the commanding officer of the only field artillery battalion in the First Army and at Fort Knox, I find it interesting and challenging to serve with the highly qualified officers and men of Armor at Fort Knox.

I have concluded that I have no choice but to request membership in the Armor Association. The enclosed check will attest to my good intentions. I submit this request willingly of my own accord and in anticipation of receiving your fine publication.

ROBERT C. TURNER
LTC, Artillery
Commanding

3d Howitzer Battalion, 3d Artillery
Fort Knox, Kentucky

Welcome! You are following in some famous armored field artillery footsteps. Well known names come to mind—to include Generals Devers, W. B. Palmer, Spivy, F. J. Brown, Ruhlen, Burba, and Beverley. Of these, two have served as presidents of the Armor Association—Generals Palmer and Brown.

THE EDITOR.



The AH56A

In Support of Tank Operations

by WILLIAM R. TUCK

What will the Army's new fighting helicopter, the *AH56A Cheyenne*, do for Armor?

You, the reader, are asked to consider yourself a tank battalion commander. Your battalion belongs to an armored division. You are in combat in the mid-1970s. On this operation you have a task force consisting of your tank battalion, an infantry company, a platoon of combat engineers, and an *AH56A* platoon of five *Cheyennes*. Of course, you have artillery in direct support, and with you is an Air Force Forward Air Controller who can obtain TAC air support. Your mission is to advance in your assigned zone of action to seize an assigned objective, and be prepared for further action.

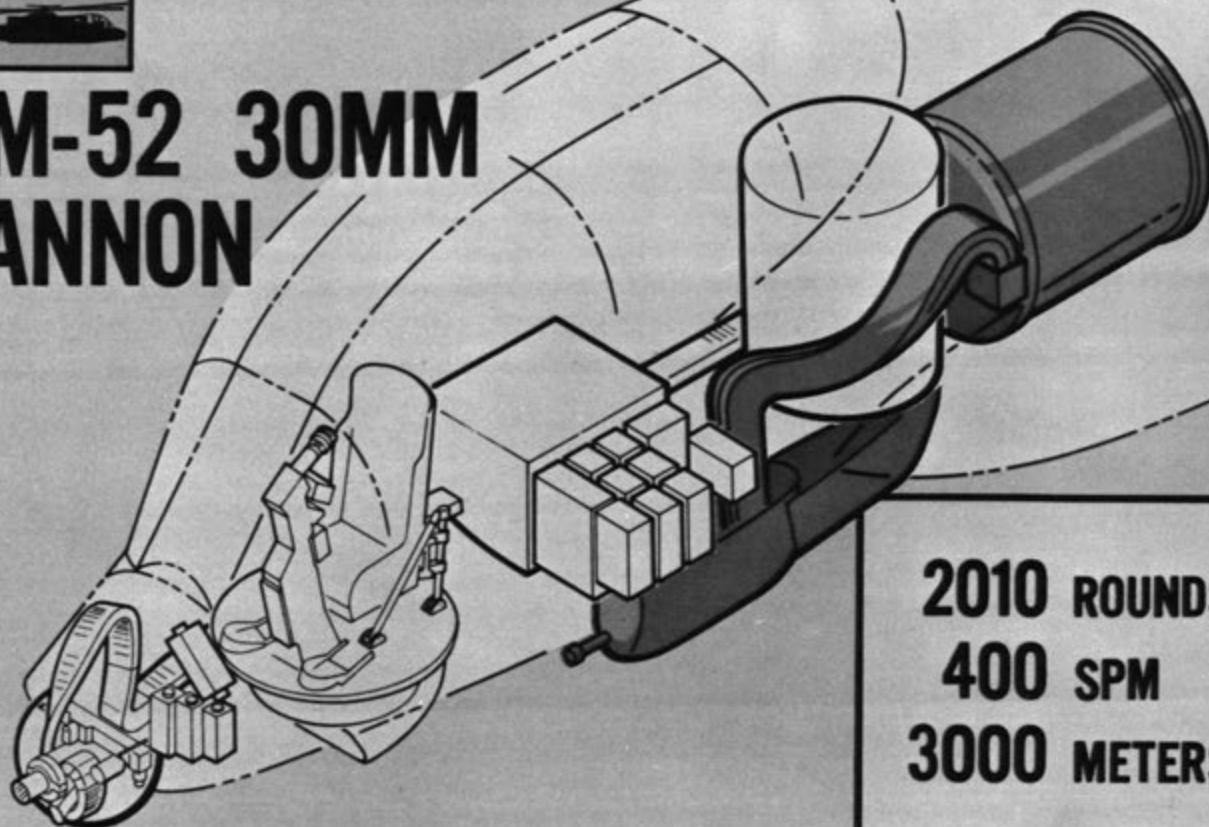
As your task force advances on its mission, you have the *Cheyenne* unit commander keep at least one fire team over your unit on constant lookout for enemy activity. The remainder of the *Cheyennes* are standing by on the ground just a kilometer or two back of your forward elements, ready to move for-

ward on call. If the situation indicates, these can be placed on standby in the air.

The *Cheyenne* is admirably suited for this overwatching job. The fact that it flies gives it the capability to climb up so it can look behind hills, ridges and treelines. Nothing new here over other aircraft. However, the *AH56A*, with its computer-directed fire control system, has a unique ability to search the terrain, and to examine, in detail, suspicious places or things, even from long ranges. The *AH56A* copilot/gunner is equipped with a direct sight for search, and a periscopic sight which has three levels of magnification—1.5 power, 4.25 power, and 12 power for detailed examination. When the periscopic sight is placed on a point, the computer, on command from the copilot/gunner, will keep the sight on that point as the *Cheyenne* flies along or maneuvers. Thus, the copilot/gunner can examine suspected positions with up to 12-power magnification as the *Cheyenne* approaches, flies by, or goes beyond or around the point.



XM-52 30MM CANNON

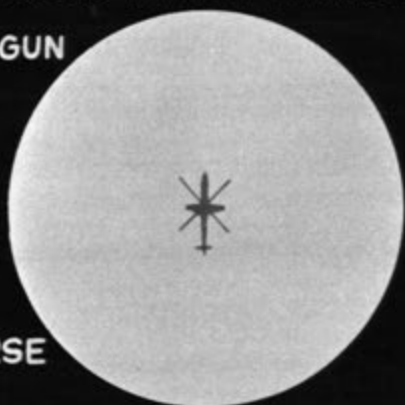


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3000 METERS

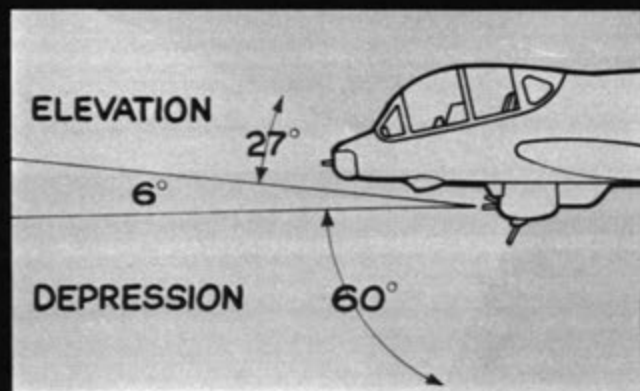
LOCKHEED-CALIFORNIA

BELLY TURRET 3000 METER RANGE

30 MM GUN



360°
TRAVERSE



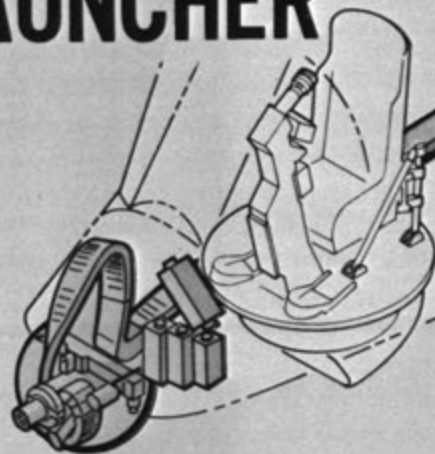
The copilot/gunner's seat turns a full 360 degrees (actually 200 degrees in either direction from straight ahead). As a result, he doesn't have to turn in his seat, but just keeps his eye on the comfortable eyepiece of his periscopic sight directly in front of him. All the while the laser rangefinder, mounted in the periscopic sight, measures the range from the *Cheyenne* to the point and automatically feeds the range to the central computer. A readout of the range is provided to the copilot/gunner within his sight picture telling him whether and/or when he is within the range of his weapons.

From your standpoint as the tank battalion commander, other features of the *AH56A* fire control and navigation systems are most valuable. Once the copilot/gunner has his sight on a point on the terrain, a special panel in the pilot's compartment can give a readout of the UTM map coordinates of that point. The pilot can transmit these map coordinates plus a description of the target to you via one of his two FM radio transmitters. The thought passes through your mind of the great advantage it is to have such accurate and instantaneous information on enemy location. You reflect that even during the night, the night-vision device on the *Cheyenne* will allow for continuous observation and location of the enemy. Its self-contained navigation system allows navigation by map coordinates without reference to any ground based navigation aids.

LOCKHEED-CALIFORNIA



XM-51 40MM GRENADE LAUNCHER



780 ROUNDS
350 SPM
1500 METERS

LOCKHEED-CALIFORNIA

You can see the *Cheyenne* flying over your forward elements. Suddenly, you see a spurt of fire from the aircraft toward its right rear, and simultaneously another spurt is emitted to its right front. The pilot calls you on his radio and says that he and the co-pilot sighted two widely separated groups of enemy soldiers at the same instant, and fired on them. He then gives you the map coordinates of the locations of these enemy troops, and reports that casualties have been inflicted. You recall that the *AH56A* has two turrets, and what the *Cheyenne* unit commander told you about them.

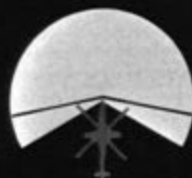
The new 30mm gun is housed in the belly turret. A unique feature of this turret is the 360-degree traverse, with 27 degrees elevation and 60 degrees depression. Actually this turret will rotate 200 degrees from straight ahead in either direction. The gun has an effective range of 3000 meters and a cyclic rate of 420 shots per minute, or about seven shots per second. The 30mm round is explosive, and highly effective against both materiel and personnel. The ammunition drum will carry 2010 rounds.

A second turret position in the nose of the *Cheyenne* mounts either a 40mm grenade launcher turret or a 7.62mm minigun turret. These turrets and their ammunition can be interchanged in less than 10 minutes.

The 40mm grenade launcher turret will traverse 100 degrees from straight ahead in both directions,

NOSE TURRET 1500 METER RANGE

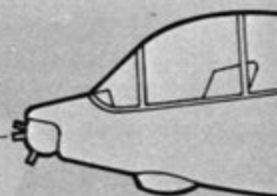
40 MM GL-200° TRAVERSE



7.62M MINIGUN - 240° TRAVERSE

ELEV. ANGLE 18°

DEPRESSION 70°
ANGLE



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11,570 ROUNDS
750, 1500, 3000, 6000
SPM SELECTABLE
1100 METERS



XM-53 7.62MM MINIGUN

for a total of 200 degrees, and will elevate 18 degrees and depress 70 degrees. The 40mm grenade launcher, thus mounted, will have an effective range of 1500 meters. It has a cyclic rate of 350 shots per minute, and 780 rounds of ammunition can be carried in the ammunition drum.

The 7.62mm minigun turret will traverse 120 degrees in either direction from straight ahead, or 240 degrees total. Like the 40mm turret, it will elevate 18 degrees and depress 70 degrees. It has an effective range of 1100 meters. Four rates of fire are available, 750, 1500, 3000 and 6000 shots per minute, selectable merely by thumb pressure. The ammunition drum shown will hold 11,570 rounds of 7.62mm ammunition.

You reflect on the advantages of a supporting vehicle having two turrets, both accurately aimed by the fire control system, and both capable of firing on different targets or at the same target simultaneously. The number of rounds aboard indicates the tremendous volume of fire that can be brought to bear from a single *AH56A* to destroy or suppress enemy targets.

Okay, so the *Cheyenne* has two flexible gun turrets and can deliver high volumes of fire. Your main threat, however, comes from enemy tanks and associated armored antitank weapons. What does the *AH56A* have to counter these? It is currently designed to carry six *TOW* antitank guided missiles, in two pods of three missiles each on the two inboard

wing pylons. The *TOW* antitank guided missile has a range of more than a mile and will penetrate any known tank in existence today. As can be seen, the *TOW* guidance system is located in the periscopic sight, so the 12-power magnification of that sight is available for sighting on a target. The ability of the fire control system to hold the sight on a point, even as the *AH56A* maneuvers, provides a high probability of hitting a tank. It is emphasized that once the copilot/gunner has locked the sight on the point of a stationary target, and has launched the *TOW*, then basically he has nothing else to do, for the fire control system keeps the sight on target. Once the *TOW* has been launched, the *AH56A* can be turned, and can climb or descend to keep from flying close to the target area and to minimize vulnerability to enemy anti-aircraft fire.

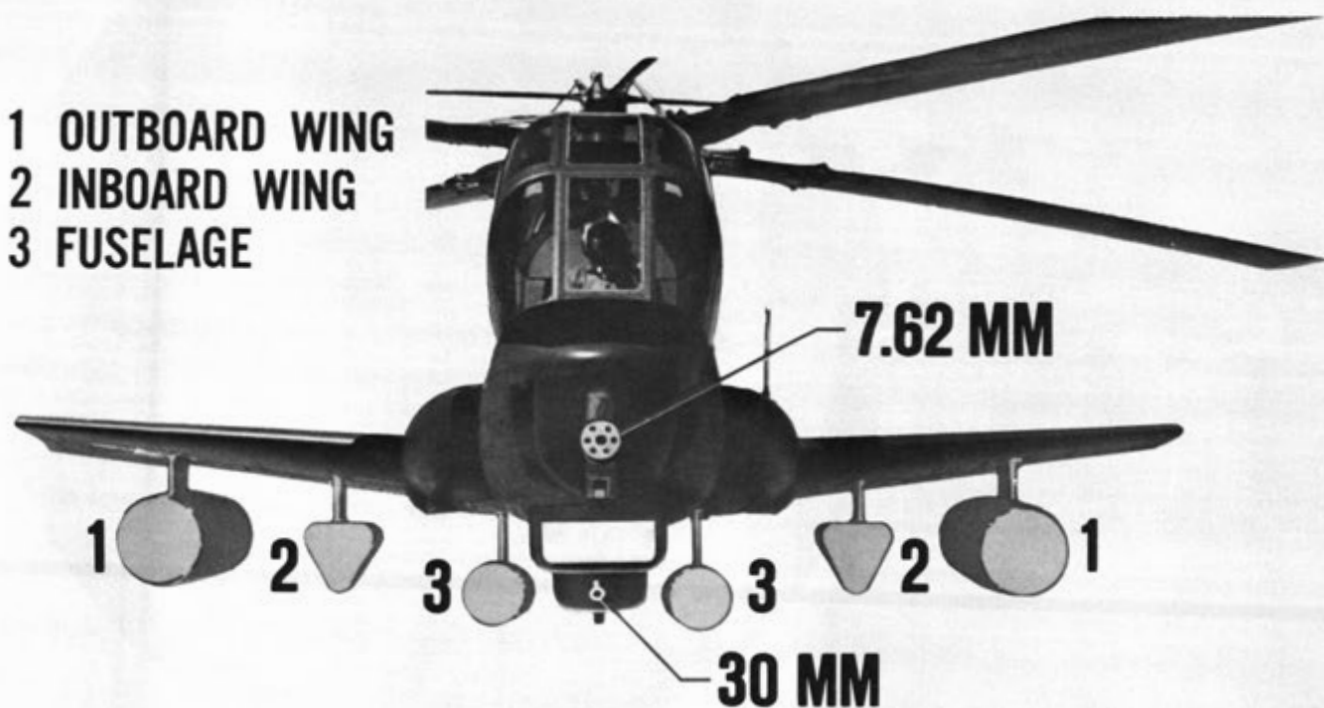
A variety of munitions can be carried externally. There are six pylons on the *Cheyenne* capable of carrying 2000 pounds each, for a total of 12,000 pounds. Two pylons are mounted on the fuselage and two on each wing. The large capacity of the six pylons provide great versatility in carrying external armament. For example, 152 2.75-inch rockets can be carried on the wing pylons. Moreover, the fire control system can compute and indicate to the pilot the impact point of these rockets. If *TOW* missiles are carried in the inboard wing pylons, then up to 114 2.75-inch rockets can be carried in the outboard wing pylons.

The lift capability of the pylons allows sufficient fuel for over 2500 miles ferry range. Thus, the *Cheyenne* is self-deployable anywhere in the world.

This morning when the enthusiastic *Cheyenne* unit commander reported to you and started telling you all these wondrous capabilities of the *AH56A*, your old Missouri blood began to boil. So you interrupted the *Cheyenne* commander and told him in no uncertain terms that sales pitches by zealots might be tolerated under peacetime conditions in the States, but dammit, we're at war, and we have a fight on our hands, right here, today! So cut the chatter on what your bird might do under various optimum conditions, and tell me how much ammunition it will carry and how long it will fly under the conditions of today and right here. You explained that you are tired of having supporting aircraft leave the battle just when you need them most, to go back for fuel or ammunition or both.

The *Cheyenne* unit commander seemed to have had these questions thrown at him before. He quickly explained that *AH56A* has a 3450 horsepower en-

- 1 OUTBOARD WING
- 2 INBOARD WING
- 3 FUSELAGE



THE WEAPONS SYSTEM

gine which provides for heavy loads, and thus can carry 2850 pounds of fuel. This is enough, generally, for more than three hours' total flight or well over 2-½ hours' endurance with adequate reserve fuel.

As to ammunition, he explained it this way. The highest terrain we'll have to operate over here is about 2000 feet in elevation, and the temperature will vary from below 70°F. in the morning, late afternoon and night to about 80°F. in mid-afternoon. We like to start our missions with full fuel tanks. So under these conditions we will carry the following ammunition: a full internal load of 2010 rounds of 30mm and 780 rounds of 40mm ammunition. As this is tank country, we will always carry six *TOW* missiles, and you can always count on us starting out with at least 38 2.75-inch rockets even during the hot part of the day. We can carry 76 rockets when its around 70°F.

It was funny how the experiences of Vietnam are still on aviators' minds, for the *Cheyenne* commander added as an afterthought, that even in the highlands of Vietnam in the hottest period experienced there, the *Cheyenne* could operate easily with full fuel load, a full load of internal ammunition, and 38 2.75-inch rockets. In the delta south of Saigon, even at 100°F., a full load of internal ammunition and up to 114 rockets could be carried with full fuel tanks.

You also remember asking the *Cheyenne* commander a question which has bothered you for some time. Why does the *AH56A* need its sophisticated

fire control system? You couldn't help but smile as you remember that the same question had often been asked of you, concerning the new model tank which you had recently received. So you listened with more than a passing interest to the aviator's answer.

The *Cheyenne's* fire control system is directed by the copilot/gunner with his swivelling periscopic sight and/or the pilot with his helmet sight. The copilot/gunner's periscopic sight is the primary system. It has a laser rangefinder, magnified vision, *TOW* guidance, and night vision. Once the periscopic sight is placed on a target, the fire control system will keep it on that point as the *Cheyenne* maneuvers. The turret guns are continuously adjusted for lead and accurately measured range, so that the first burst of fire will have a very high probability of hitting the target. With this system, the *Cheyenne* can place and keep accurate fire on a target at long range, even while firing to the side and rear, flying at speeds to over 200 knots, and as it turns and climbs or descends. The high accuracy at long-range ability to fire to the side and the rear provides instant response, sustained standoff engagement, and the ability to inflict high casualties to the enemy because of high first burst hit probability. No "garden hosing" of the trajectory is required, thus the enemy is surprised.

The pilot has a helmet-mounted sight. This sight is in the fire control system. When the pilot moves his head and places his sight on a point, the system aims the turret weapon he is using at that point. Infrared



IN THE BACKGROUND, A BATTLEFIELD AS VIEWED WITH THE NAKED EYE. IN THE FOREGROUND, A SPECIFIC AREA OF INTEREST AS SEEN WITH 12-POWER MAGNIFICATION THROUGH THE AH56A CHEYENNE SIGHT.

sensors detect his head movement and transmit the direction and angle of movement to the computer. The computer gives necessary lead and elevation commands to the turret guns. It is important to note that the copilot/gunner can fire both turret weapons simultaneously or individually, the pilot can do the same, or each can fire one of the turret's guns simultaneously.

Briefly, the fire control system works like this. A series of gyroscopes in the inertial platform provide stability and aircraft attitude inputs to the computer. A Doppler radar measures speed and direction of the *Cheyenne* and of the wind, and feeds these data to the computer. The laser rangefinder feeds a measured range. Stored in the computer are the ballistic characteristics of the weapons. Using all these inputs, the central computer calculates necessary adjustments to keep the periscopic sight on the target, and to adjust the turret weapons and the *TOW* to provide highly accurate fire. The fire control system will indicate the predicted impact point of the 2.75-inch rockets on the pilot's direct sight.

The *Cheyenne* commander concluded by emphasizing that the true combat value of the *AH56A* lies

in the combined capability of all its components: its ability to hover and to dash at 220 knots (250 miles per hour); the great maneuverability and agility of the aerial vehicle; the ability to fly for over three hours with large payload of ammunition; multiple weapons providing antitank, antimateriel, antipersonnel, point and area target lethality or suppression; flexible turrets allowing 360° traverse with one and fire at another target with the other; low depression angles allowing plunging fire; a fire control system making possible highly accurate fire at long range, and the ability to navigate by map coordinates independent of ground based navigation aids.

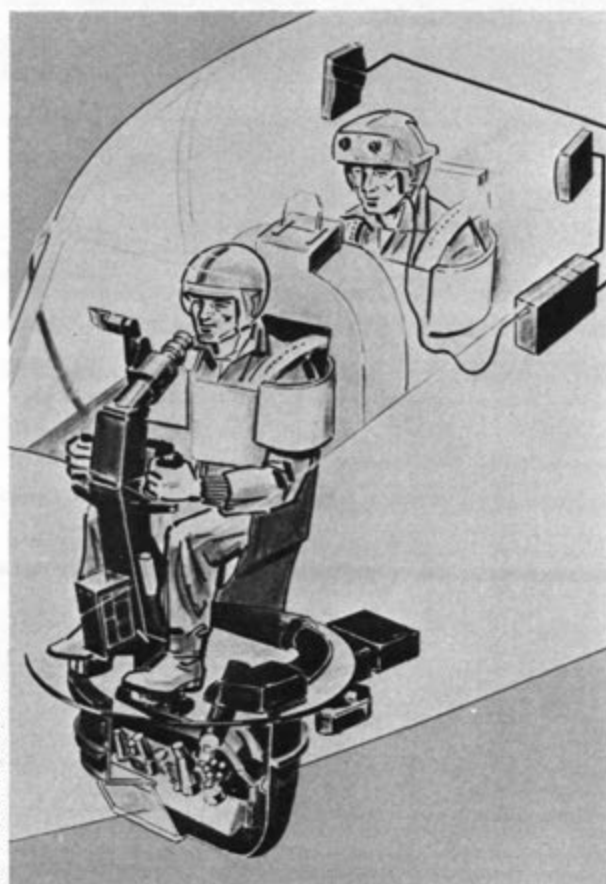
The *Cheyenne* commander paused at this point and asked if you had time for more convincing on the value of the *AH56A* fire control system or anything else. You said that this is about as much as you could assimilate at one time, that H-hour for today's attack was approaching, and you had better get on with the war.

So here you are, your battalion task force is advancing, you watch the operations of the *Cheyenne*. The enemy is well equipped with antiaircraft weapons, so the *Cheyenne* is staying with your leading

elements, flying at altitude, and the copilot is using his eyes to search and his magnified sight to examine the enemy terrain. Suddenly he reports recognizing an enemy tank camouflaged in a clump of trees on a hill some 2000 meters in front of your leading element, and some 5000 meters slant range from him. He gives the coordinates.

The gunner stabilizes his periscopic sight on the enemy tank, the pilot enters the map coordinates in his computer. When this is done, an instrument needle in his cockpit points toward those coordinates and an odometer on the instrument tells him the distance to the enemy tank. The pilot dives to tree-top level, and using the valleys and folds in the earth to mask his flight path, flies to a preselected point on a small ridge some 2500 meters to the flank of the enemy tank. With his needle indicating the direction to the tank, he makes sure that the nose of the *Cheyenne* is pointing toward the tank when he pops up over the ridge, so the copilot/gunner can launch the *TOW*. The copilot/gunner is ready, places his sight on the tank, and launches the *TOW*. A moment later an indicator tells the pilot that the *TOW* is tracking, so he immediately turns away from the enemy tank. As he is in this turn the pilot sees enemy troops about 200 meters to his left front. He places his helmet sight on this and fires the 40mm grenade launcher on them as he passes. The copilot/gunner calls over the intercom that the enemy tank has been destroyed.

Your ground reconnaissance reports scattered mine fields covered by machine gun fire in the valley about 1500 meters in front of the hill on which the enemy tank was just destroyed. Enemy artillery begins to fall on your lead tanks. The *Cheyenne* copilot/gun-



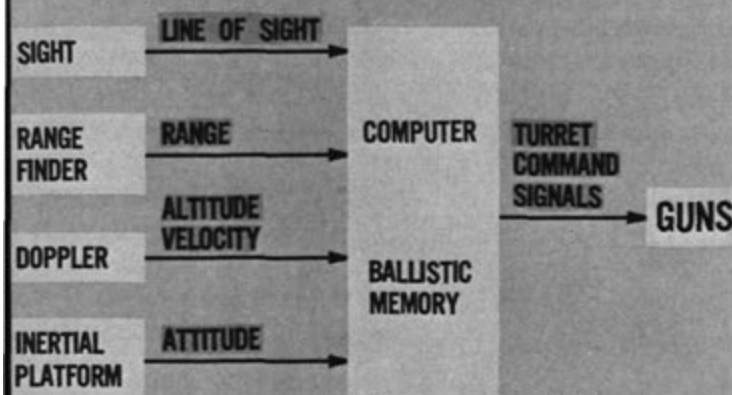
LOCKHEED-CALIFORNIA

FIRE CONTROL

ner sees this and searches the enemy rear area. He sees muzzle flashes which appear like an artillery battery position, and places his sight on that position. The pilot, with his computer control panel, instantly obtains a readout of the map coordinates of the enemy artillery position which is about 5000 meters behind enemy lines. He reports this to your artillery liaison officer. The artillery liaison officer requests counter-battery fire, and TAC air on the enemy artillery. The *AH56A* can dash in at tree top level, blast the artillery with aimed rocket, 30mm, and 40mm fire, and dash back—and be over enemy lines probably less than two minutes.

Your reconnaissance element, trying to breach the mine field receives antitank fire which disables one of your tanks. The *Cheyenne* crew examines the area of the ridge overlooking the mine field, and notes tracked vehicle tracks, but is unable to pinpoint any enemy tanks or antitank weapons because they are well camouflaged in the woods. However, when the *Cheyenne* pilot reconnoiters by firing 30mm at long range into the woods he is able to pick up dismounted troop activity with the 12-power peri-

FIRE CONTROL SYSTEM



LOCKHEED-CALIFORNIA

scope. He reports their precise location to you. As he overwatches from his aerial vantage point, he sees an enemy command car speeding along a covered route, invisible to your ground element and about 2000 meters slant range from him. He immediately destroys it with his 30mm cannon.

Your brigade commander informs you that resistance is being met across the entire division front, as the enemy has been found all along the ridgeline to your front. A coordinated division attack is ordered with H-hour at 1700. In preparation for this attack you direct that passage through the mine fields be found or cleared. You use your artillery, mortars and other ground weapons to suppress the enemy during the mine field clearance operations. You have the AH56A overwatch this operation to pinpoint enemy weapons and movement, and place immediate fire on them. Through this coordinated effort the mine fields are breached and your command is ready to attack at H-hour.

Your plan of attack is to concentrate on a particular hill on the enemy-held ridge, which offers the best approaches for your attack. During the attack you have a coordinated fire support plan under which supporting artillery, TAC air, mortars, small arms, and tanks in hull defilade positions keep fire on the objective and on other areas from which the enemy might fire on your attacking units. For the attack you order all your supporting *Cheyennes* forward. Their mission is twofold. Two of them are to keep a constant watch on the rear of the enemy-held ridge for any enemy reinforcement or counterattack, and are to attack this. The high dash speed and agility of the AH56A allows it to dash behind enemy lines to strike targets and to return quickly, allowing little time for enemy reaction. This agility further provides for instantaneous exploitation of changing enemy situations.

The other AH56As are to search the enemy-held ridge to pinpoint enemy weapons and positions and to destroy or suppress them during the attack. Once the objective is seized, the *Cheyennes* will attack withdrawing enemy troops, and will search for and strike counterattack efforts by the enemy. As night closes in the *Cheyennes* continue to overwatch and to attack the enemy using their night vision devices.

The author, in presenting these few ideas on the tactical capabilities and possible tactical uses of the *Cheyenne*, acknowledges that potential enemy anti-aircraft weapons systems have been somewhat underplayed. The purpose here has been to provide food for thought on ways by which the *Cheyenne* can be

used, and the tactical advantages which accrue. The technique of standing off behind friendly lines, searching for enemy with the sighting system, then dashing in to strike and dash back is offered as one which could pay off even against modern anti-aircraft weapons. The versatility of the *Cheyenne* gives it an unusual capability to exploit instantly changes in the tactical situation and weaknesses in enemy defenses, both ground and anti-aircraft.

As one reflects on these possibilities, memory is jogged to all of the weapons and devices which have been created to stop the tank. Techniques have been developed, and will be developed, by which the tanks can overcome these threats and continue to apply their shock action, firepower, and mobility against the enemy. Official faith in the tactical importance of the tank is exemplified by the number of tanks in the current U.S. Army force structure, and the projected structures for the 1970 and 1980 decades. The AH56A offers a tremendous adjunct to tanks and to combined arms warfare. Get to know it. Learn to use it.



LOCKHEED-CALIFORNIA

COLONEL WILLIAM R. TUCK, Armor, USA-Retired became associated with tanks on entrance into the Army in 1939, when he was assigned to the 1st Cavalry Regiment (Mechanized) of the 7th Cavalry Brigade (Mechanized). That Brigade formed the nucleus of the 1st Armored Division when it was activated in 1940. Col. Tuck served with the 1st Armored Division throughout World War II, first as a tank company commander, then as a tank battalion commander and later as the Division G-2. Following World War II he returned to Fort Knox to serve on the staff and faculty of the Armor School. In 1955 Col. Tuck entered the Army Aviation program, and in 1956 participated in the early experiments on arming helicopters. As a member of the Army Board for Tactical Mobility (Howze Board) in 1962 he participated in tests of armed helicopter operations. From 1963 to 1965 he was assigned to the Test, Evaluation, and Control Group which tested and evaluated the air assault concept and the 11th Air Assault Division, now the 1st Air Cavalry Division. Upon retirement in 1965, he joined the Lockheed-California Company, and has been assigned for the last three years to the systems analysis group of the AH56A (*Cheyenne*) project office.

ARMOR is in the red—and red is not Armor's color

Last year the Association's financial statement showed a net loss of over a thousand dollars; rising expenses have really caught up with us!

why?

While the active duty officer strength of the Armor branch has doubled in the last four years, the number of officer members of the Association has stayed about the same.

Today, about half of the Active Army colonels of Armor, about one-third each of the lieutenant colonels, major and captains, and about one-quarter of the lieutenants of Armor are members of their Association. Only one out of every 25 eligible NCO's belongs to the Association.

Of active duty company-size Armor units, just over half subscribe to **ARMOR**.

Army National Guard and U.S. Army Reserve membership and unit subscription statistics are equally challenging.

Armor Association membership dues have not changed in over 18 years. In the same period every other similar professional association has raised its dues at least twice.

your council acts

At the May 1968 meeting of the Executive Council, General Waters appointed a committee to look into the Association's financial situation. Here are some important recommendations of that committee which have been approved by the Executive Council.

✓

New membership dues of \$6.50 for one year, \$12.00 for two years, and \$18.00 for three years to become effective 1 January 1969.

✓

Subscription rates for **ARMOR** will remain the same except for adding a three year price. Subscription prices have been raised twice since 1950.



ARMOR will retain its professional emphasis, continuing to print quality material without paying authors or accepting advertising.

✓

Administrative changes in Association operations and financial methods to streamline the system and improve the service given members have been made and will continue. Most still pending require new money for equipment.

✓

An immediate member-subscriber drive with **initial** goals of forty percent of the Active Army officers (29 percent now), twenty percent of the NCO's (four percent now), and all the company-size Armor units (60 percent now). Similar goals are to be set for Armor people and units in the Army National Guard and the U.S. Army Reserve.

The report of the Committee on the Association's Financial Condition emphasized that the combination of at least 1000 new members-subscribers and increased rates will be necessary to put the Association on a sound financial footing for the next five years.



needed, more armor spirit

The Committee concluded its report to the President with the observation that our Association is deserving of much more enthusiastic support than it has been getting—FROM US ALL. Our professional journal is unique. The quality of the magazine and the caliber of the people who write in its pages are outstanding in the field. We have sustained the professional image. We must press on with spirit to continue to do so.



DOCTRINE in the DARK

by Major Robert E. Wagner

In his article, "The 24 Hour Soldier," (ARMOR, May-June 1968) Captain William A. Izzard asked why Armor commanders do not train for night operations. He then discussed various training techniques and suggested that motivation of individuals was the key to successful preparation for night operations. In this article, the author proposes that current doctrine discourages training and planning for, and execution of, fully effective Armor night operations.—THE EDITOR.

Does current doctrine capitalize on Armor's inherent capabilities to maneuver against deep objectives at night? Is Armor given an adequate doctrinal base to bring about training leading to a real night offensive capability?

Night offensive capability can be defined as the ability to maneuver at night cross-country over a variety of terrain against *deep* as well as limited objectives.

Since World War II our enemies, active or potential, have been, and are today all outstanding night fighters. Armor doctrine and training must recognize this enemy capability.

This article analyzes night offensive doctrine in the light of what appears to be Armor's true night offensive potential. It is based on the firm beliefs:

- That an armor unit capable of attacking cross-country at night against deep objectives is a great asset on the battlefield.
- That an armor unit *can* be trained to this capability.
- That, therefore, doctrine can be analyzed in the context that a night offensive capability (as defined in this article) is both desirable and possible.

Most, if not all, will agree that an Armor unit having a night offensive capability is a tremendous

asset on the battlefield. It cannot be assumed, however, that our Armor units can be trained to this capability following current doctrine. True night offensive capability should not be confused with the long night road marches culminating in a set-piece attack against limited objectives frequently encountered in many current training situations.

Here we are concerned with the capability to maneuver—not march—against deep objectives, perhaps fighting all the way.

BRITISH ARMY NIGHT TRAINING

I commanded a British tank squadron for two years in northern Germany and became fully familiar with British night training at first hand. The British Army does not recognize a major difference between night and day operations. Its combat arms are trained to operate in both environments. Its field training exercises are divided into day and night training phases. There is no difference in the operational scope between these phases which involve the full spectrum of tactics to include night assault river crossings.

The British employ a variety of night training methods which are predicated on acclimatizing the soldier, particularly the tank commander, to the element of darkness until it becomes an operational asset rather than a liability. The British emphasize all of the night training techniques used by the U. S. Army to include night vision, night firing, illumination, and infrared devices. However, they place much greater emphasis on night navigation so that long range operations can be conducted. They not only train in night techniques but they achieve a real night operational capability.

The night tank rally was one very effective training technique employed by the British when I served with them. This exercise required individual tanks to negotiate a course over very difficult terrain at night. A tank rally was essentially a mounted and expanded night compass and map course. When a tank commander could go through these rallies with facility he was capable of maneuvering surely over a wide variety of terrain at night. Based on my

MAJOR ROBERT E. WAGNER, Armor, is a 1957 graduate of the Virginia Military Institute. He has served with numerous armor units at company command and unit staff level in CONUS, Korea, and Germany to include two years with a British armored regiment in northern Germany. His last tour was as a subsector adviser in IV Corps, Vietnam. He is a graduate of the Infantry Officer Course Basic, the Armor Officer Career Course and the Command and General Staff College of which he is now a faculty member.

personal observation and execution of British night training techniques and operations I am convinced that Armor units can be trained to attack over long distances at night.

ISOLATING OUR DOCTRINE

It is difficult to isolate Armor night offensive doctrine for the division and for smaller units. FM 17-1 states the doctrine for all Armor units, although a study of this manual reveals that much of it is aimed primarily at battalion task force level or lower. FM 17-30, *The Armored Division Brigade*, devotes only one short and general paragraph to night offensive operations. This paragraph is basically a much condensed summary of what is contained in FM 17-1.

FM 61-100, *The Division*, promulgates doctrine common to the airborne, armored, infantry, and mechanized infantry divisions but does not deal specifically with night offensive doctrine for an armored division. Section IX, Chapter 5, FM 6-100 entitled "Night Combat" is remarkably similar to Section IX, Chapter 6, FM 17-1 entitled "Night Attack." Except that FM 17-1 contains a more detailed discussion on control measures and a short paragraph on scheme of maneuver, these are virtually identical.

"Subordinate commanders should have adequate time for reconnaissance. They should be able to observe, during daylight, terrain over which their units will move in order to fix terrain features which will aid maintenance of direction."—FM 17-1, Section IX, paragraph 146 d.

"Subordinate commanders should have adequate time for reconnaissance. They should be able to observe, during daylight, terrain over which their units will move in order to fix terrain features which will aid maintenance of direction."—FM 61-100, Section IX, paragraph 5-57 d.

FM 100-5, *Field Service Regulations—Operations*, announces doctrine for all levels of command, but has particular application for those above division.

Since FM 61-100 is virtually identical to FM 17-1 with respect to night offensive operations, FM 17-30 is too short and general, and FM 100-5 applies to command levels above division, this article will confine itself to discussion of the night offensive doctrine which is set forth in FM 17-1.

Night attack doctrine as stated in FM 17-1 favors employing Armor units offensively at night. However, a study of this doctrine reveals that there are implied, if not actually stated, restrictions regarding the nature of these operations. The manual does not openly state that long range operations will not be conducted at night. But it implies restrictions to a point that if its guidance is followed, nothing but the simplest set-piece operation against limited objectives could be contemplated during the hours of darkness.

The restrictions implied in FM 17-1 contrast sharply with Armor's inherent capability to conduct deep operations as set forth in the same manual. The advantages of gaining surprise and applying continuous pressure around the clock against an enemy are noted positively on the one hand; while on the other, the problems of psychological factors, reconnaissance, navigation, and maneuver control at night are stated with equal certitude. These problems are serious considerations when planning night attacks but not so formidable that they should limit a commander's thinking to set-piece operations against limited objectives.

At this point it might be useful to examine and comment on the doctrine concerning the foregoing factors which is announced in Section IX, Chapter 6, FM 17-1 entitled "The Offense."

BASIC DOCTRINE

- "a. Night combat is an integral part of all armor operations. Night attacks and night operations offer excellent opportunities for achieving deception and surprise.
- b. Night combat that achieves surprise may offer opportunities for success when daylight operations are impractical. This is especially true when friendly forces lack air superiority. Continuous pressure applied day and night, particularly against a weakening enemy, hastens decision. Relentless exploitation around the clock denies the enemy time for regaining his composure and speeds his destruction."—Paragraph 145

This statement prescribes proper doctrine for night operations. It is in subsequent paragraphs that restrictions are implied or stated. This quote was included to show that our basic doctrine is

sound. It is later, when dealing with the details of night operations, that restrictions arise. It is almost as if the author of this portion of the FM had talked himself out of his initial comments.

PSYCHOLOGICAL FACTORS

"It is desirable to employ troops in night operations that have not been engaged in fighting all day. Troops become fatigued more easily in night combat due to the added physical and psychological stress and strain."—Paragraph 145

There has always been a "the goblins will get you if you don't watch out attitude" surrounding night operations. This attitude can only be eliminated by training to a true night operational capability. Proper training gives the soldier confidence in himself and in his equipment which will enable him to operate in any environment. Combat, whether it takes place during night or day, is a fatiguing experience. In fact, if the enemy has air superiority, or is occupying fortified positions with excellent fields of flat trajectory fire, it would be far less nerve wracking to operate at night. Obviously, it is not desirable to employ troops who have been attacking all day in a night attack or vice versa.

RECONNAISSANCE AND NAVIGATION

- "c. Darkness increases difficulty of movement, maintenance of direction, and control. The time required to execute movement and emplace weapons is greater at night than in daylight. Simple schemes of maneuver with well-defined objectives and routes simplify control. Leaders must be well forward in attacking echelons. Full use is made of navigational aids to assist in the maintenance of direction.
- d. Subordinate commanders should have adequate time for reconnaissance. They should be able to observe, during daylight, terrain over which their units will move in order to fix terrain features which will aid maintenance of direction.
- g. The paramount consideration is that the attacking troops be as familiar as possible with the terrain over which they will attack."—Paragraph 145

Prior reconnaissance as an assist to navigation and formulating a scheme of maneuver is important in any operation. When conducting deep, continuous operations, however, prior reconnaissance becomes difficult, if not impossible. Commanders cannot look over all of the terrain between the LD and the objective area. Nonetheless, the commander is enjoined to make a prior reconnaissance no less than four times on one page. The reader cannot help but get the distinct impression that if prior reconnaissance is impossible, night operations are impossible. Also, stating the requirement to conduct reconnaissance over the entire zone of operations severely restricts tactical thinking. The commander then thinks in terms of limited objectives only since long range reconnaissance in a fast moving situation is extremely difficult.

Navigation is difficult at night and terrain is a major consideration. Admittedly, it is a great help to be able to look over the entire area prior to a night attack. However, a unit can be trained to overcome these limiting factors and they should not be emphasized to the point of restricting the scope of night operations.

MANEUVER CONTROL

[At Night] . . . "It is difficult to change direction. Complicated maneuvers are avoided to decrease the danger of firing on friendly troops. Attacks normally are made in one direction and in a relatively close formation to facilitate control. Nevertheless, simple maneuvers may be used by tank and mechanized infantry units employing vehicular navigational aids and infrared equipment."—Paragraph 148

The restrictive nature of this paragraph is self explanatory, especially the sentence ". . . simple maneuvers may be used. . . ." Only the simplest scheme of maneuver is contemplated ostensibly because of the problems posed by control and navigation. If this doctrine is complied with, no commander could possibly undertake anything more than the simplest and shortest night operation. This contrasts with Armor's true capability to conduct long range operations involving the entire spectrum of tactics. Moreover, this doctrinal edict implies that much reliance must be placed on the use of navigational aids and infrared equipment to permit the execution of even simple forms of maneuver. The most important navigational aid of all, the unassisted human eye trained to navigate at night, is not mentioned.

CONCLUSION

Current doctrine as stated in FM 17-1 does not capitalize on the inherent capabilities of Armor to maneuver against deep objectives in night offensive operations. This is unfortunate because doctrine is the foundation upon which our training programs are built. Armor's night combat potential will never be fully exploited until its true night offensive capability is reflected in our doctrine. FM 17-1, and other doctrinal manuals, should emphasize the importance of night training, particularly in night navigation, to overcome what are now portrayed as severe obstacles to night offensive operations. Most importantly doctrine should encourage commanders to visualize the night offensive battle in the same way that they view the daylight attack.

From The Armor Branch Chief....

AVIATOR QUOTAS AVAILABLE

Expansion of aviation in Armor continues to provide additional career opportunities for qualified personnel. Quotas are available now for applicants to begin initial entry flight training in rotary wing aircraft at Fort Wolters, Texas. Applications should be processed in accordance with the provisions of AR 611-110, dated 24 June 1967. See your local personnel officer for details. For additional information regarding class schedules, contact LTC Derrick, Armor Branch, Oxford 6-8507.

To the right, STARBOARD to be left...

by Major Ray R. Rall, Jr. USMC-Retired

In the military lexicon of capital crime and mortal sin, just below treason and ranking roughly with desertion under fire, kidnapping, and the more exotic sex crimes, you will find (if you look) the term "Missing Movement." Inclusive in that term are a host of inferences, most of which reek of white feathers hand delivered (with a gauntlet to the cheek), swords broken over adjutant's knees, and a roll of drums as a snivelling wretch is canned thru the stockade gates. Even if the offence is not associated with avoiding hazardous duty, the aura of professional dereliction it carries is enough to blacken the record of the most junior enlisted men. For an officer, it spells disaster to his career, ignoring probable disciplinary action. But for a Commanding Officer . . . ? No hell could be hot or deep enough.

Which brings us close to if not at, the point or theme of this story. But first . . . some background.

In 1962 and for some years prior, the United States maintained among its forces in the Far East, a marine division and a marine air wing. The division was quartered mainly on Okinawa (of World War II fame) and the wing in Japan. A system of rotation of personnel was employed to provide a "normal" tour of thirteen months at these and some of the lesser posts in the Western Pacific. This was regarded as either "sharing the wealth" or "reducing personal hardship," depending on the relative state of family bliss or economic circumstances of the participants.

Replacements for the Far East were assembled each month at Camp Pendleton and El Toro, California, formed into temporary organizations known as replacements drafts and dispatched to their overseas destination by ship. In the normal course of events, such a draft would proceed to Honolulu for a short stop, thence to Japan to unload wing replacements and finally to Okinawa, a total voyage of some three weeks. There, the draft would disband and its component personnel be reassigned for more permanent duties.

Thanks to the luck of the draw or some other formal selection process, I fell heir to a replacement

draft late in 1962 and was duly invested its commander with all the powers and privileges pertaining thereunto.

Passing over troop processing (records, immunization shots, etc.) and other necessary preparations, we sailed from San Diego, had a very short layover in Hawaii and then on to Japan. The trip was pleasant and uneventful and my own circumstances aboard could not have been improved. And, in the standard course of events, we arrived at the Yokusaka Naval Base to debark replacements for the First Marine Air Wing.

After releasing my reluctant charges, liberty call was sounded for the remainder of the draft and most of them, myself included, took the opportunity to go ashore, stretch the legs, shop for souvenirs and such other diversions as their individual tastes decreed. Among other things, Japanese ports teem with portrait artists of widely varying degrees of skill. Most of their work is done from photos, formal portrait or snapshot. I entrusted a color snap of my wife to one of them upon his promise of a completed portrait by eleven the following morning. Sailing time for Okinawa had been published to all hands as 1400 the following day and reinforced with threats of extended tours or early return to unloved ones appropriate to the individual case.

Next morning at breakfast with the ships Captain, I reconfirmed the sailing time and went ashore for further shopping. After purchasing several toys for my sons, I proceeded to the artist's shop by eleven and found it tightly shuttered. A house-to-house search of the vicinity and a liberal distribution of apocryphal Japanese warnings and menaces, cribbed from a handbook and prior service, activated the neighborhood to a surprising degree. This was particularly remarkable since much of my monologue was made up of such phrases as "Your road will be mined," "How is the Emperor's health?" "We are about to open fire," and the like. In any event, the artist was produced under escort by noon as well as an incomplete portrait. I stationed myself at his elbow

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and proceeded to badger him to fill in the blank spaces with all possible haste.

At 1230, rather than pinch myself for time, I accepted his substandard efforts, engaged a taxi, and headed for the base docks, arriving shortly before 1300. I dismissed the cab, turned shipwards and found . . . *no ship*.

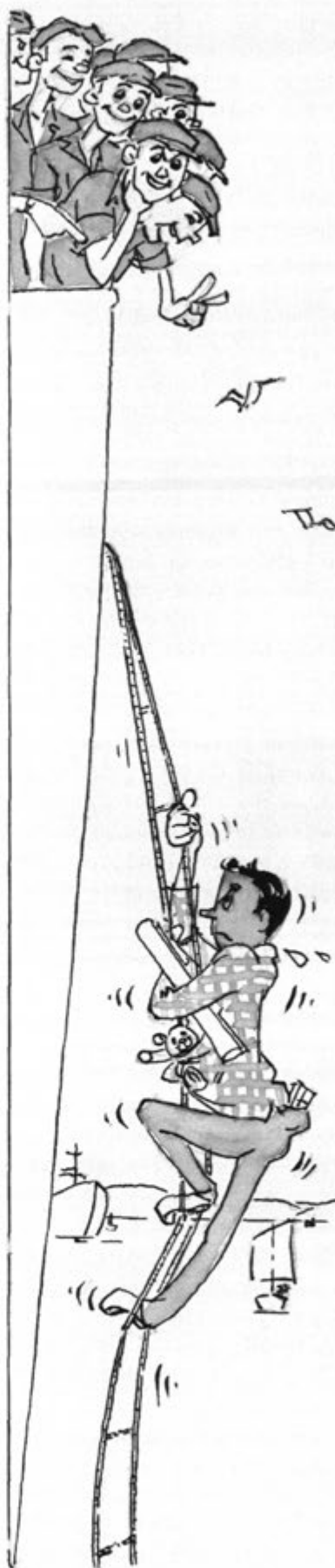
No sputtering fuse, no physical threat, not even inadvertent proximity to Gabriel's horn will produce a deeper panic in yours truly. The Yokusaka Harbor Control Office was shortly treated to the sight of a perspiring, sport-coated berserker, semi-circled with inadequately wrapped packages, waving identification, shouting pleas for ship locations and specific threats against no specific individual. The senior present, a chief petty officer (the officers were lunching) must have been singularly talented for he evidently did perceive the basic requirement. He located the ship; she was about ten miles down channel, almost to the open sea.

The absence of superior authority was most fortunate for me. The Chief was sufficiently impressed, or perhaps confused, by my tale to accept the vital if vague necessity of my reaching the transport. I'm sure if he heard half my spiel that visions of re-enacting the escape from Corregidor danced in his head. With a pickup crew of two, I was soon barreling down channel in a picket boat (ex PT boat), complete with portrait, packages, perspiration and a stomach knot of fear much too large for such a small boat.

Meanwhile, things had happened aboard the transport. The Captain, previously assured of my presence by a draft officer whom I have since unfortunately been unable to crucify, was informed of my present whereabouts by Harbor Control radio. He took immediate action. A gentleman of one of the better old schools (no service academy implications intended) and recalling our morning's conversations, *he stopped the ship in mid-channel and waited.*

Now Yokusaka is no insignificant port servicing shrimp-sized shrimp boats and itinerant surfboards. It's a big port, a busy port and in a very short time, inbound and outbound naval and commercial deep draft ships were queuing up in both directions. In taking this step, the Captain had knowingly placed himself in significant professional jeopardy and to this day I recall his act of generosity and sense of responsibility with deep appreciation and respect.

Up channel, things were going less than well, which by now could be expected. The portside engine began to smoke and then burst into flame. Momentarily it crossed my mind that an additional honorable solu-



MARY BURNEY

tion other than successful return to the ship had presented itself. "Death by misadventure at sea," (at least in channel) now appeared possible. My companions, however, handled this emergency well, shutting down the engine and smothering the fire with available equipment. I'm certain my shortlived hysteria escaped notice under my steely calm. I doubt if they even noticed my knotting the cuffs of my trousers for flotation gear.

Up till this moment, the chatter back and forth on the Harbor Control radio net had been a reassuring thing, keeping us aware of our objective's stationary posture and other naval minutiae not significant to me. Now a new, rasping voice came up on the net, evidently the Harbor Control Officer, back from a thoroughly unsatisfactory lunch.

A polite synopsis of his remarks is as follows: "What's the name of that officer who commandeered my picket boat?" The coxswain turned inquiringly to me and I gave him my name. "Major Rall." What with the engine noise, he misunderstood and replied to Harbor Control, "Major Gall."

This was greeted by silence, the frequency went dead and we received no further transmissions. In my mind, I visualized the Harbor Control Officer quick-timing his entire staff to the legal office, eager to get their joint testimony concerning this additional impertinence into the form of sworn statements. Someday I must find out what ministering angel or incompetent clerk shortstopped that charge sheet.

Now limping at a quarter of our former speed on one engine, we proceeded on our unmerry way. Centuries or minutes later, my haven came into sight, straddling the channel broadside and steadfastly ignoring the horn tooting and electronic profanity of her up and downstream neighbors. We limped up to our goal, a Jacob's ladder swinging from the ship's portbow overhang. For those unfamiliar with a "Jacob's ladder," a multitude I'm sure, it's a rope ladder with no helpful rigidity for the climber and totally undeserving of the name ladder on that account.

Tucking my coattails into my belt to create stowage space and stuffing the space thus provided with my packages, with rolled portrait under one arm, I mounted the ladder with heartfelt thanks to my crew, much difficulty and no dignity.

The ship's rails were lined with draft and crew, over a thousand pairs of eyes in all. No pains had been spared in preparing for my coming and as I swung a leg over the rail, teddybear peeking from my armpit, I was piped aboard with suitable honors:

"Draft Commander Portside," a ceremony oddly omitted on many prior occasions at dockside.

Conquering a temptation to return down the ropes, I made my much encumbered way through a saluting and snickering rabble who only the previous day had appeared good troops. At the bridge, as we got underway, the Captain explained the circumstances leading to my unperceived abandonment. I responded with a summary of my own activities, waited a decent interval to indicate unperturbed leadership and then made my way to my cabin to hide.

But my trial by ordeal was not over. First morning out of port, any port, it is the troop commander's unpleasant but essential duty to dispense justice to any offender charged with misconduct ashore. The more serious offenses he should normally refer to court-martial that he himself convenes. Lesser crimes, and by far the majority of these are simple cases of late return to the ship, are usually dealt with on the spot unless the accused requests a more formal court.

That dreadful morning, attending officers and non-commissioned officers made little but token attempts to suppress their disloyal mirth as I helplessly dismissed case after case of "absence over leave" with warnings and without even a satisfying snarl.



MAJOR RAY R. RALL, JR., USMC-Retired, enlisted in the Marine Corps in 1944. After a brief, but health enhancing, tour at Parris Island he was sent/delivered to the Officer Candidate Applicant Course at Camp Lejeune and thereafter to the Marine V-12 program at Villanova College. Following his discharge in 1946, he reentered Villanova from which he was graduated with a BS in Education (English major) in 1949. A thorough search of the help wanted ads indicated no shortage of English speakers/writers and shortly thereafter he was commissioned in the Marine Corps. English speech was, of course, standard in the Marines but prior service and completing the NROTC program encouraged a tolerant view of his qualifications. During the Korean War, in common with many contemporaries, he contracted the platoon leaders' disease (characterized by a purple spot over the left breast). Then followed combat duty as a weapons company commander and assignments as an instructor at Quantico and Coronado and with units throughout the world. He is currently a sales representative of the RAND Corporation and writes on the side. (His left side since he is totally righthanded.)



ARMOR OFFICER ADVANCED COURSE 3

1968

Some Observations
On
Japanese Armor Today
日本装甲部隊、今日

by Major Ronald A. Hofmann

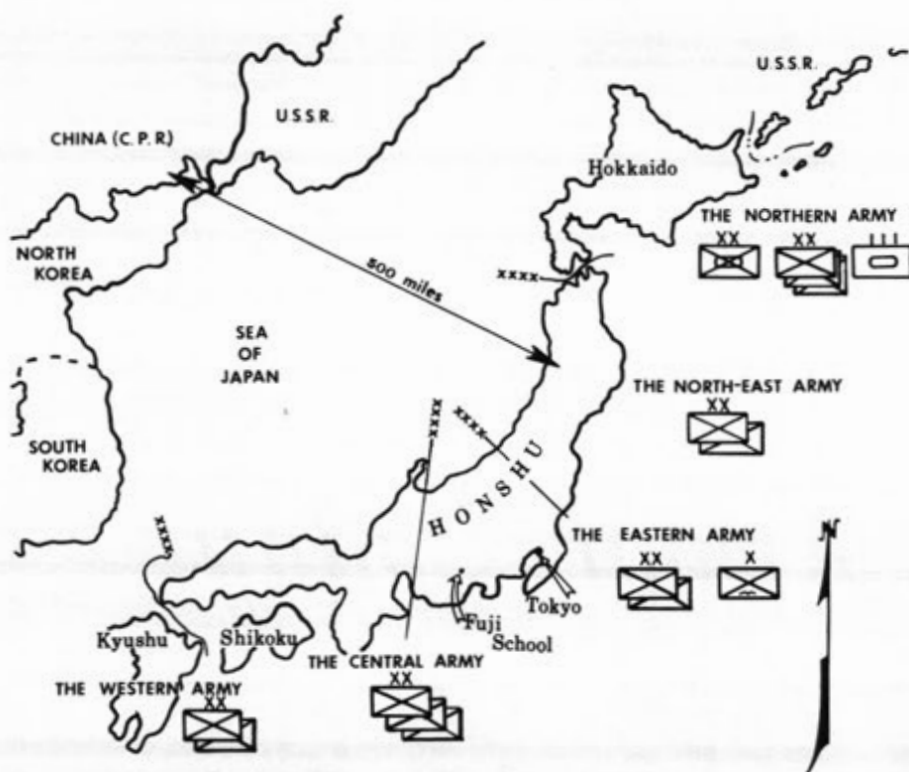
"Swift as a breeze, calm as the forests, aggressive as a fire, and steady as a mountain" is the ancient Japanese cavalry doctrine that inspires once more the tank and reconnaissance elements of Japan's Ground Self-Defense Forces (GSDF).

As outlined in General Tomio Hara's article "The Development of Modern Japanese Armor" (*ARMOR* July-August 1968), Japanese designed tanks and armored carriers are rolling off production lines regularly. Research on doctrine is proceeding in the Armor centers; and materiel development is receiving attention from both the military and industry.

Armor units are located throughout the 1100-mile-long island group with each of GSDF's 13 combat divisions. But the preponderance of the armored and mechanized units are based on the Island of Hokkaido, under the operational control of the area command known as "The Northern Army." The nation's largest tank formation, the 1st Tank Group, which has over 200 tanks, and GSDF's lone mechanized division are stationed on Hokkaido.

This article is based in part on study and in part on personal observations made while visiting Japan. Its purpose is to acquaint armor leaders with the current status and thinking.

MAJOR RONALD A. HOFMANN, Armor, has a deep interest in Far Eastern military affairs. He has served a total of five years in that area including nearly three in Vietnam where his last assignment was as a troop commander in the 11th Armored Cavalry. In 1965, and again in 1967, he visited various Japanese military activities. He particularly wishes to acknowledge the hospitality of the staff and faculty of the Fuji Combined Arms School and other JGSDF Armor officers who were helpful to him. All opinions expressed are, however, his own. Major Hofmann is now assigned to the Faculty of the US Military Academy.



ORGANIZATION OF TANK BATTALIONS

Under the Third Five-Year Defense Plan, begun in 1967, all divisions are eventually to have four infantry regiments. In addition, one tank battalion is organic to each combat division. Total division strength is to be some 9000 men. Division tank battalions which now have only three companies will activate a fourth one to conform to the reorganization of the other division elements.

The tank battalion headquarters has four organic tanks, one for the commander and one each for the operations officer, the artillery liaison officer, and the forward air controller. Each company has 14 tanks with four being in each of the three platoons and two tanks in the company headquarters for the commander and the forward observer. The 1st Tank Group is organized somewhat differently. Each of its three battalions consists of three heavy tank companies, which field four platoons apiece. The platoons here, as with their American counterparts, each have five tanks.

ARMORED EQUIPMENT

The Japanese still use many *M4* and *M24* tanks, as well as the more recent *M41*. But these are gradually being replaced by the Mitsubishi pro-

duced *ST61* tank, which is now in mass production. The *ST61* has received good grades from foreign observers. The 35-ton tank is powered by a 600hp diesel engine, mounts a 90mm gun, is equipped with two machineguns and a coincidence range finder, and has an infrared capability. This armored fighting vehicle is specifically designed for Japanese terrain and for easy shipment on Japanese railroads. Japanese tankers are well pleased with its performance.

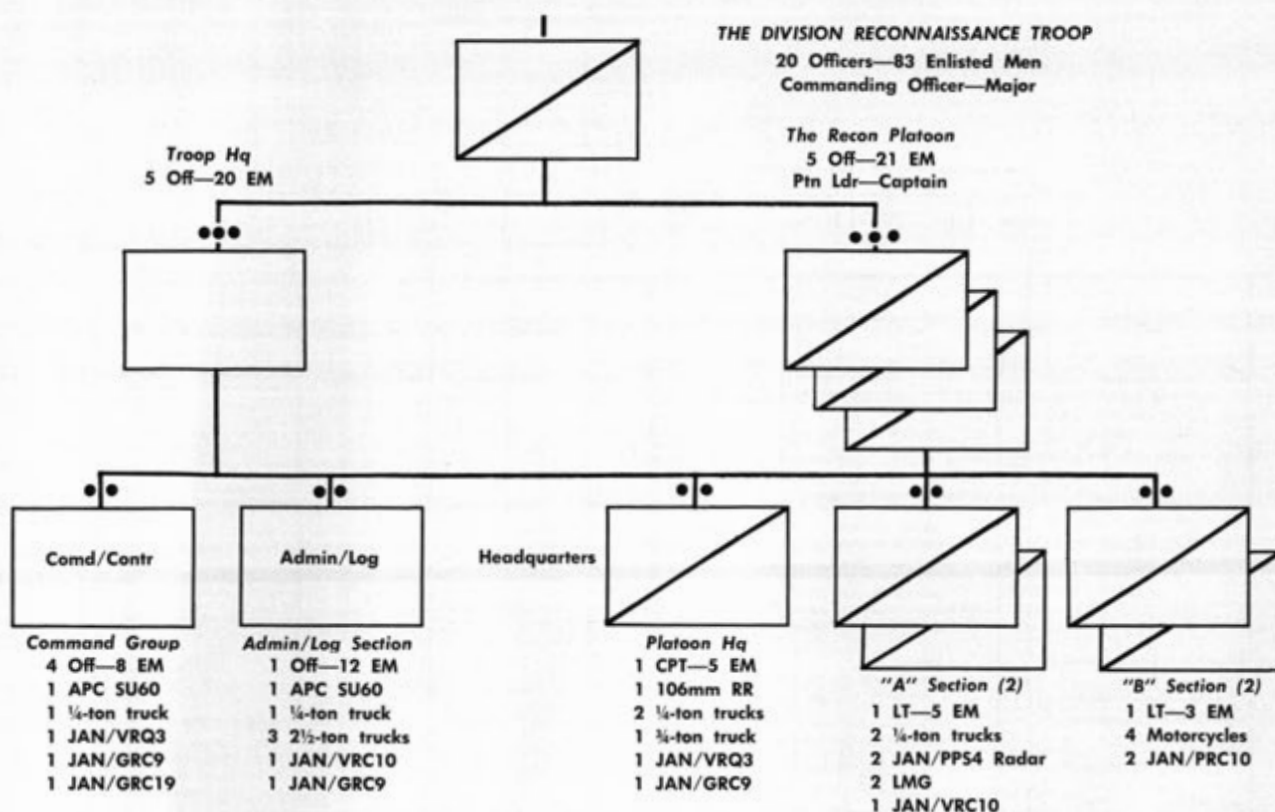
However, enthusiasm for the locally designed armored carrier *SU60* appears to be considerably less. This vehicle, used by armored control and maintenance elements and by mechanized infantry, is heavy and cumbersome and has no amphibious capability. A replacement is under consideration at this time.

The tank battalion's biggest headache, from a logistical standpoint, is the lack of standardization of equipment; each company may be equipped with a different type tank. This is the result of the hold on the purse strings by the government with respect to defense procurement. Nonetheless, in the future more money may be made available to speed up modernization, particularly since the emphasis in the Third Defense Plan is on new equipment.

THE RECON ELEMENTS

The organization and equipment of recon units differ considerably from those of the American armored cavalry. It appears to me that the difference may not be due as much to different viewpoints in doctrine as to a lack of funds for equipment. An indication of this is the two exceptions to the usual recon unit organization—the armored cavalry troop of the mechanized division and the recon platoons of the 1st Tank Group's battalions. The platoons of these organizations consist of two tanks, an armored infantry squad, a scout section with jeeps, and an 81mm mortar squad with two jeeps.

In contrast to his American counterpart, the Japanese division commander must make do with one cavalry troop. The chart shows the organization



of the infantry division reconnaissance troop. These troops can be considered elite units. Because of their relatively large troop headquarters and many officers (20 per troop), the recon troops are often reinforced with additional combat elements and used for independent task force operations. In all cases, the troop commander reports directly to the division commander.

The division tank battalion also has an organic recon platoon, identical to the platoons of the division recon troop.

Emphasis is placed on reconnaissance by stealth. Moreover, much of the training is conducted at night or under conditions of limited visibility. When looking at the authorized equipment, the extensive use of Japanese-made PPS4 radar sets and of Honda motorcycles stands out. The Japanese are fascinated by the possibilities of electronic equipment as detection devices under conditions of poor visibility. And, they have achieved good results with their radar.

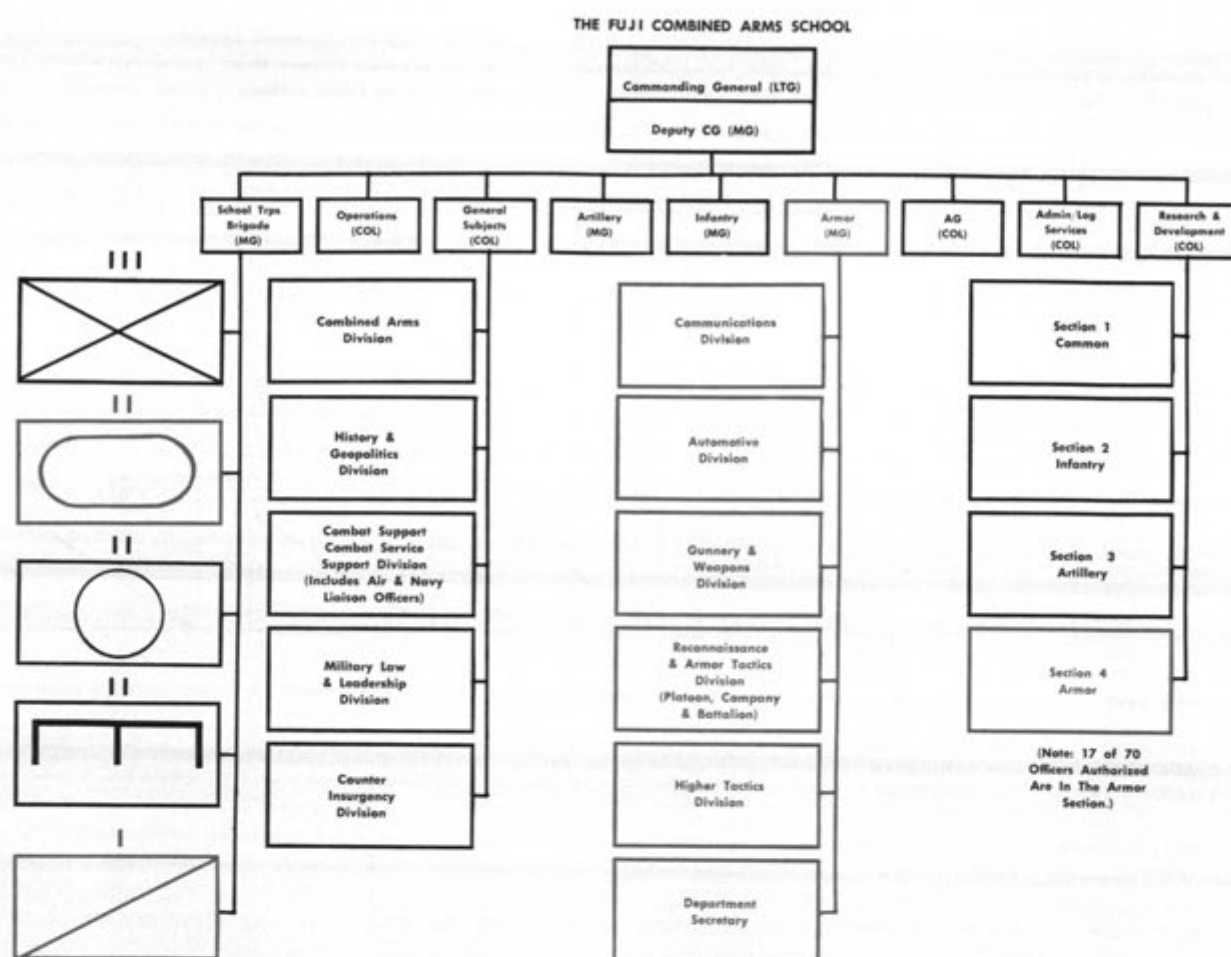
The 175cc Honda motorcycle on the other hand, is considered by many to be a temporary, cost-saving expedient. I found that my initial enthusiasm for this vehicle was not shared by a large number of the users. The Honda is light and extremely agile over Japan's narrow roads and restricted terrain. A unit

can quickly disperse with them. However, the disadvantages of limited night operations and cross-country capabilities, combined with the inability to return fire without dismounting appear to outweigh the seeming advantages.

TRAINING EMPHASIS

Tank and recon units spend much of their time in the field where they participate in joint training with infantry and combat support elements. While American armor doctrine has influenced Japanese thinking, the Japanese have not hesitated to learn from their own experiences of World War II. A few combat veterans are still active in the armored units, and they undoubtedly have influenced tactical thinking. Noteworthy is the fact that the possession of nuclear weapons by two of Japan's neighbors has made all very conscious of the importance of CBR defensive training.

Company commanders draw up their weekly training schedule which is based on the battalion quarterly master plan. The battalion receives its guidance from the Tank Battalion Program of Instruction, which is further supplemented by annual special instructions from the GSDF General Staff and from the division headquarters.



THE FUJI COMBINED ARMS SCHOOL

The influence of the Fuji School on the GSDF and its role can best be compared to an imagined combined influence of the Combat Developments Command and the US Army Armor, Artillery and Infantry schools on our army.

Located 100 miles west of Tokyo in the scenic Shizuoka prefecture, the school center conducts the research and development, as well as the officer training, for the combat arms. Here each Japanese armor officer comes for the basic and advanced courses. In addition, most attend one or more specialized courses.

The area in which the school is located has played an important role in Japanese history. The present Fuji School site was essential to the Tokugawa Shogunate in Edo (now Tokyo) as one of the key outposts against its enemies. More recently the Imperial Japanese Army made use of the area.

The Fuji School was reopened at its present location on the slopes of Mount Fuji in 1954. Not only is its location historic but it is in the center of one

of Japan's most beautiful areas. Each year thousands of tourists visit Mount Fuji and the many spas of the Hakone-Lake Ashi area. The Gotemba Pass to the south of the school is still one of the two entrances from the south into the important Kanto plain.

The Combined Arms School is headed by a three-star general. At the school, over 500 officers are engaged in teaching or research. The Armor Department is commanded by a major general and has a staff of 50 officers. An additional 17 officers work in the Armor Research Office under the direction of the school's Research and Development Department. The School Troops Brigade, with a strength of 220 officers and 2900 men, consists of an infantry regiment, a battalion each of artillery, tanks and engineers, and a recon troop.

RECRUITMENT AND TRAINING OF ENLISTED MEN

Since there is no draft or conscription of any kind, attractive incentives must be offered to induce young men to join the GSDF. An enlistee signs a

two or three year contract which is only binding on the government and which allows the enlistee to quit at any time. Apparently few do. Probably an important factor in influencing soldiers to complete their enlistments is that if they leave before its end they forfeit the generous bonus paid on completion of the entire enlistment. Moreover, much credit for the high retention and reenlistment rate belongs to the unit leaders who motivate young men to stay on and continue to serve their country.

Japanese armor officers frequently cite that indoctrination of the soldier with patriotism and the spirit of civic responsibility are the most important subjects of all those in the training given. Armor has been relatively successful in filling its ranks, though few units meet fully their authorized strength.

Enlistees come from all regions of Japan, but the highest percentage come from the Island of Kyushu. The average enlistment age is between 18 and 19, and high school graduates are preferred. The recruit takes two and one-half months of basic combat training at one of the five GSDF area command training centers. He then attends armor advanced individual training at the Armor NCO and Enlisted School in Komakado, 110 miles west of Tokyo. On completion of this, he may be selected for further training as, for example, a three-month recon technique course or a vehicle repair school. Only after the new soldier has completed this training is he assigned to an operational tank or recon unit. As a rule, his first assignment is close to his home.

THE ARMOR NCO

To become a noncommissioned officer, a soldier must have served for at least two years. He must pass the Armor NCO School Entrance Examination and successfully complete the five and one-half month NCO Candidate Course. The course teaches him the duties and responsibilities of a junior NCO and gives him the technical and tactical knowledge he will need. On graduation he is promoted to the grade of sergeant. The Armor NCO Course is the only formal NCO schooling conducted. Promotion to the remaining two higher NCO grades is based on demonstrated proficiency and seniority. Senior NCOs frequently are selected to attend specialized officer courses such as maintenance or communications courses.

THE JUNIOR OFFICER

The annual requirement of roughly 70 armor junior officers is filled from three sources: 20 to 25 graduating cadets from the Defense Academy,



Japanese armor passes in review.

a school similar to West Point though a joint services academy; 15 to 20 aspirants recruited from graduating university classes throughout Japan; and, the remainder from the NCO corps.

Officer candidates attend a one year course at the GSDF Officer Candidate School in Kurume, Kyushu, before they are commissioned. The only exception is that annually a very small number of direct limited-duty commissions are awarded to highly experienced NCOs, who after attending a one month OCS course are assigned to Armor units as staff officers.

On completion of the OCS course, former NCOs immediately attend the 35-week Armor Officer Basic Course. Defense Academy and college graduates must first spend a year with a tactical unit before attending this course. After an officer has completed the basic course he may be selected to attend such specialized courses as the Weapons Officer Course (six months), the Communications Officer Course (one year), the Recon Officer Course (six months), or the Organizational Maintenance Course (six months).

After two years in grade, the Japanese officer is promoted to first lieutenant. Then, in his fifth year of commissioned service, the Armor officer attends the 30-week Advanced Armor Officer Course.

It is evident from the extensive schooling required of junior officers, that the Japanese place great emphasis on thoroughly training and evaluating their junior leaders before entrusting them with command. As a result, the quality of junior officers is unusually high.

The most serious problem in officer procurement is attracting sufficient well-qualified college graduates. There is concern that the armor branch is relying too heavily on the NCO corps to fill the gap. There is an abundance of NCOs eager to apply for a commission. However, the GSDF would like to continue the policy of maintaining a well-balanced and well-educated officers corps. In this, they feel, civilian university graduates must play an important role. In the early 1950s a large pool of university applicants was available. But today, with the booming economy and the resultant enticing salaries and careers offered by industry, a military career is no longer as appealing. This is particularly true since military pay has not kept pace with that of the economy. However, the problem is not one of pay alone.

Though the GSDF has existed for 14 years, and has made determined efforts to create a favorable public image through such programs as civic action in remote areas and disaster relief, many Japanese are still confused or hazy about its role. Part of the confusion is the result of the policy of disavowing any connection with the former Imperial Japanese Army. An example of the effects of this policy is the complete renaming of the rank structure. A captain, for instance, is now called "Ichii" or government junior military servant, first class. Such things certainly have not aided recruitment.

ADVANCED CAREER DEVELOPMENT

Promotion to captain comes between the sixth and seventh years of service. An officer's future career at this stage is strongly influenced by his performance in the Command and General Staff School Entrance Examination. Competition to enter that school is extremely keen. Each year only five to eight Armor officers are selected to attend the 18-month course. The school is located with the JSDF Joint Staff Headquarters at Ichigaya, Tokyo, the location of the former Imperial Japanese Army General Headquarters.

Promotion to major requires at least five years in grade, with Command and General Staff School graduates receiving preference.

The highest level schooling, offered only to se-

lected senior field grade officers, is also conducted at Ichigaya. The two courses on this level are the Advanced General Staff Course and the Joint Staff Course. Armor input to each course has been limited to one to two students annually.

Small military forces are often faced with the problem of maintaining a balance of experienced personnel and, at the same time, avoiding stagnation. The approach taken by the Japanese is to base active duty retention on age and rank attained. Soldiers who cannot advance to NCO status by age 35 are released from active duty. Officers in the grade of lieutenant colonel and below retire at 50. Senior general officers must retire at 58, which is the maximum age limit. All GSDF members contribute to a pension fund, and their retirement pay is based on the amount they have contributed.

THE FUTURE

Japan's emergence as a leading economic power, combined with its increasingly more active role in Asia, could possibly bring about a marked upward revision of its armored strength. At the present time, Japan's armored forces play a small, but important, role in the defense of the home islands. Their greatest strength is the high caliber of well-trained and dedicated men in them.

Behind these forces lies an industrial base and engineering talent capable of producing the most sophisticated equipment. Japan continues to enjoy the world's fastest gross national product growth rate. With an estimated 1968 GNP of \$128.1 billion, Japan will overtake West Germany as the world's third biggest economy coming after only the United States and the Soviet Union.

Japanese political consciousness is on the rise. At the same time, there is a greater awareness of the necessity for international cooperation with other free nations in Asia. And, attitudes toward the military are changing. As a result, recruiting problems should recede and popular support for the defense forces should increase.

Japan's defense spending continues to be small when compared with that of its neighbors. However, defense expenditures have doubled every five years. Therefore, Japanese Armor should be able to have much of its obsolete equipment replaced in the near future.

Properly equipped, the highly proficient and dedicated men of Japanese Armor will continue to play an even more effective and important role in the defense of freedom.

AIR DEFENSE for the ARMORED DIVISION

by Major Charles C. Walters



The date was 6 June 1944. The place was Normandy. During the initial phases of the D-Day landings, the German forces were feeling the full weight of Allied air power. Of the mobile forces available to the Germans, only the 21st Panzer Division was located in the immediate vicinity of the landing area. Two other divisions were made available during the next few hours after the Allied landings. These divisions—the 12th SS Panzer Division and the Panzer Lehr Division—were some 75 to 110 miles from the landing beaches at the time of the invasion. Such distances are not considered too great for the mobility of an armored force. However, neither division arrived in the landing area until almost 24 hours after the initial seaborne landing by the Allies.

Certainly many factors contributed to the late arrival of the additional Panzer Divisions—indecision on the part of the German General Staff, confusion throughout the entire German chain of command, and last but not least the control of the air by Allied planes and the lack of effective anti-aircraft weapons in the German armored divisions.

These last factors accounted for almost all of the lost time and the majority of the lost equipment, and prevented employment of these two highly mobile units at a time which proved to be extremely critical to both sides. In fact, the lack of air defense in the German units may have caused the ultimate defeat of the Germans in France.

All of this is history, but it contains a lesson which is applicable today. A lesson which may save countless casualties, win many battles and possibly affect the outcome of a conflict. It is a lesson which the UAR relearned in the 1967 Arab-Israeli War. A mobile fighting force without air superiority and/or effective air defense is incapable of completing its mission—either defensively or offensively.

During the period between the Korean War and the Vietnam conflict, the United States Army adopted a doctrine concerning air defense which dropped anti-aircraft automatic weapons from the division entirely. However, Vietnam has proven that small caliber automatic weapons can be and indeed are highly effective against modern high speed jet attack aircraft employed in ground attack missions. These missions are very similar to those assigned to tactical fighter units in support of our divisions today.

MAJOR CHARLES C. WALTERS was commissioned in Armor from Virginia Military Institute in September 1958. He attended the Armor Officer Basic and Airborne Courses and was assigned to the 1st Battalion, 33d Armor, 3d Armored Division where he served as a platoon leader, company executive officer and company commander. After commanding a USATCA training company he attended the Armor Advanced Course in 1963-64. Thereafter he was an instructor with the Command and Staff Department, U.S. Army Air Defense School. He is now assigned to the Eighth Army Support Command in Korea.

But how are we using the lessons learned in Vietnam? To answer this question, it is necessary to examine the status of our air defense as far as the ROAD division organization is concerned. A mere two years ago we had almost no air defense capability in our divisional organizations. For air defense there were only the .50 caliber vehicular machine-guns and our individual weapons. The status of training in the use of these weapons against enemy aircraft was very poor. The last true divisional air defense unit, the *M42* twin 40mm self-propelled air defense battalion, had been phased out in 1957 and there was no organization slated to replace it. The division commander had to rely on the corps and army for his air defense in the form of *Hawk* and *Nike Hercules* units. While both of these weapon systems are very efficient in their assigned role, their mobility leaves something to be desired when compared to the ground mobility of an armored division. *Hercules* is at the very best a semi-mobile weapon, and the towed *Hawk* just cannot keep up with an armored division on the move.

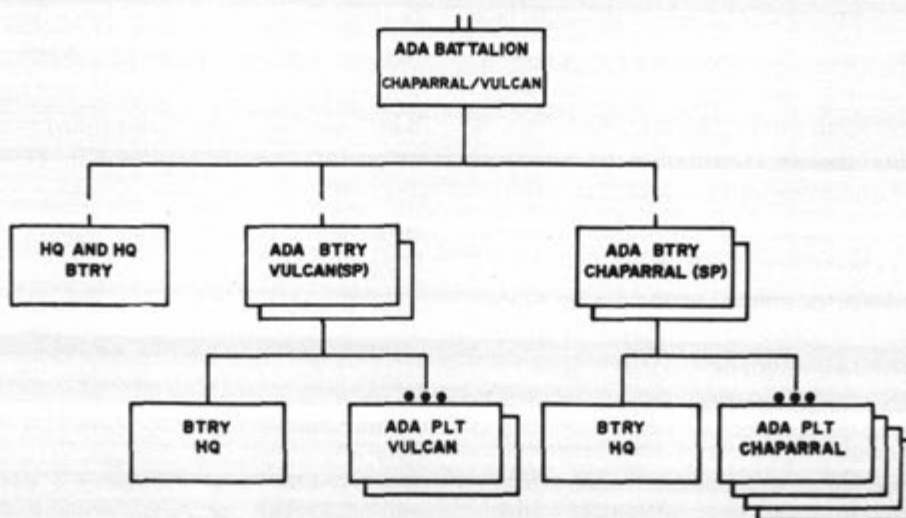
Finally realizing that forward area air defense was almost nonexistent, the U.S. Army Air Defense Board began to take corrective action. In 1966 a new weapon system and a new unit were provided to the division, marking an improvement in our air defense posture. This system is the *Redeye* which along with the air defense or *Redeye* section provides the infantry, tank and tube artillery battalions some degree of air defense capability. The *Redeye* section, which contains a varying number of teams depending upon the type battalion to which it is assigned, is

equipped with a heat seeking missile launched from the shoulder of one of the two team members. This system can destroy hostile aircraft operating in the vicinity of the combat maneuver battalions and the artillery units of the division. Nevertheless, *Redeye's* range is limited and it does not completely fill the gap between the towed *Hawk* missile system's coverage and the rear of the combat maneuver battalions. Nor was it meant to accomplish this task.

To complete the umbrella of air defense for the ROAD divisions, a new unit and two new weapons systems were developed. These weapons systems are the *Chaparral* missile system and the *Vulcan* 20mm automatic cannon weapon system. The organization of the new divisional air defense artillery battalion is shown in the accompanying chart. This is the unit which will provide a significant air defense capability for the armored division. Note that this organization is a self-propelled unit equipped with fulltracked vehicles capable of keeping up with armor movement.

Examining the organization more closely, it should be pointed out that in addition to command and control, the headquarters battery has a forward area alerting radar platoon used for giving early warning information on enemy aircraft to the *Vulcan* and *Chaparral* fire units. The battalion also will provide an air defense element to the division tactical operations center (DTOC) for the first time since 1957. The division commander will now have on his own staff an expert in air defense for planning and advice in air defense matters.

The battalion also contains two *Chaparral* batteries and two *Vulcan* batteries.



CHAPARRAL/VULCAN AIR DEFENSE ARTILLERY BATTALION FOUND
IN ARMORED DIVISION



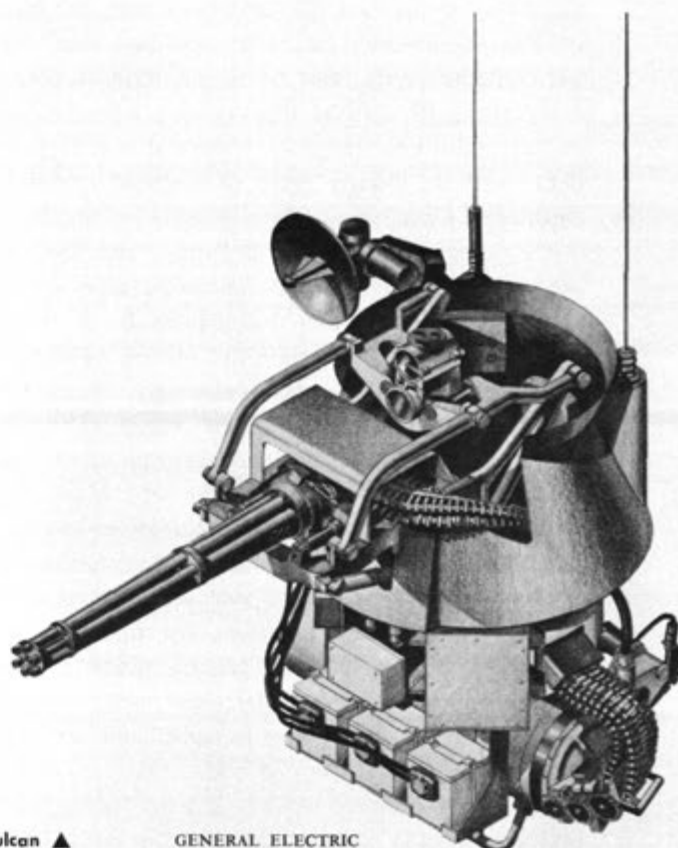
Redeye

U.S. ARMY



Chaparral ▼

PHILCO-FORD CORP.



Vulcan ▲

GENERAL ELECTRIC

These three weapon systems will give the armored divisions an air defense umbrella.

The *Chaparral* fire unit is mounted on a modified *M548* cargo vehicle and contains four heat seeking missiles per unit carried on launcher rails and eight additional missiles carried on the vehicle. The *Vulcan* weapon system is a 20mm Gatling gun carried on a modified *M113* armored personnel carrier. The weapon has two rates of fire—3000 rounds per minute for aerial targets and 1000 rounds per minute for ground targets. *Vulcan* can also be found in a towed version which is tentatively slated as a corps air defense system. *Vulcan* and *Chaparral* are capable of swimming with the incorporation of swim kits.

An older weapon system has recently been improved and it now has much greater ground mobility, enabling it to operate along with the armored and mechanized divisions. This is the self-propelled *Hawk* weapon system mounted on a modified *M548* vehicle. Although this weapon is normally employed at corps level, the increased mobility afforded by the new carrier will allow its operation in the division forward

areas as an augmentation to the air defense capability of the divisions. Filling in the dead spaces, should any exist, of the division's organic air defense units, the self-propelled *Hawk* unit greatly extends the area of coverage available to the division commander.

The vehicles for these new weapons, the *XM741 Vulcan*, the *XM730 Chaparral* and the *XM727* self-propelled *Hawk*, share common suspension and power train components with the existing *M113A1* family. This means that the logistical impact of fielding the new equipment will not be large since many vehicular parts are already in the supply system.

The addition of the *Chaparral/Vulcan* battalion and the *Redeye* sections to the division structure has greatly increased the air defense posture of the armored division. Although the tanker has not been completely relieved of his responsibility to scan the skies for enemy aircraft, he will find that he now has plenty of able assistance to keep enemy air off his back deck.

DESIGN AND DEVELOPMENT

Archilochus, an early Greek poet who once said that "the fox knows many things, but the hedgehog knows one big thing," might have called Major Heigl, the author of several pre-World War II books on armor, a fox, and General Guderian, the father of Panzer divisions, a hedgehog—had they been his contemporaries. But he would have trouble in categorizing Richard M. Ogorkiewicz, who combines encyclopedic knowledge of historical and technical detail with an incisive grasp of armored warfare as "a thing in itself."

Ogorkiewicz' new volume *Design and Development of Fighting Vehicles* cannot be read without his preceding and now out-of-print book *Armor*, if one is to fully appreciate the history of doctrine and technology, and the philosophy of armored warfare. In this respect, both volumes together represent the most recent and also one of the most comprehensive surveys of the state of the art.

Works of this type obviously cannot be too technical; there are neither engineering calculations and drawings for technologists, nor scenarios and dissections of military operations for tacticians and strategists. However, for a general reader of both groups and the general interested public, there is much food for stimulating thought, and intriguing questions.

A fighting armored vehicle is a tool designed to perform specific tasks within the prescribed constraints of mission and environment. As such, it is the subject of evolutionary processes which react to, and interact within, the changes of tool technology, mission assignments, and variations or alterations of the environment.

In his current book this evolution is described by Ogorkiewicz with such clarity and precision, that the reader cannot fail to make two observations: first, the post-World War II era did not produce any radical change in the structure of traditional missions for Armor, due in large part to an apparent insistence by the user that the measure of tank effectiveness must reflect its ability to defeat another tank in a "tête-a-tête" duel. This insistence is not only a source of unending debate on gun versus armor, but also a sign of the stability of the basic doctrine.

Secondly, there is abundant evidence of the lack of a radical technological breakthrough in conceptual design (if we exempt the S-tank). While considerable progress has been made in decreasing logistic problems, and increasing efficiency and reliability of armored vehicles "for all the changes

by

RICHARD M. OGORKIEWICZ



Mr. Richard M. Ogorkiewicz first came to the attention of *ARMOR* readers with the publication of an article entitled "Armor in Defeat" which appeared in the July-August 1950 issue. Appropriately, this was the first issue to bear the new title which had been changed from *The Armored Cavalry Journal* used earlier. The author was then lecturing at London University where he received his Bachelor's and Master's degrees. Since that time he has written 46 articles for *ARMOR*, in addition to many for other leading professional publications throughout the Free World.

When Mr. Ogorkiewicz left London University in 1952, he became first an engineer with the Ford Motor Company of England, and then, from 1955 to 1957, a development engineer with the Rootes Group, Coventry, now a subsidiary of the Chrysler Corporation. From 1957 on, he has been lecturer in mechanical engineering at the Imperial College of Science and Technology in London and a consulting engineer.

His first book, *ARMOR—A History of Mechanized Forces*, was published in England and the United States in 1960 and in Italy in 1964. He was also editor and translator of Van Senger's *The World's Armored Fighting Vehicles*. Both these classics, though out-of-print and long since unavailable, are still requested on book orders to the U.S. Armor Association Book Department.

Dr. Bekker and Mr. Ogorkiewicz share the honor of being the only citizens of countries other than Sweden who have been presented the Swedish Royal Military Technical Association's professional achievement award.

Though just now in his early forties, Mr. Ogorkiewicz has firmly established an international reputation as a leading authority on the means of armored warfare and the philosophy underlying their development and employment.

which have taken place in tank armament, the general layout of tanks remains the same as that introduced in 1917 . . ." (page 73).

This situation obviously is the outcome of the described evolutionary process, for with mission definition more or less unchanged, and tank technology not radically altered, the concept of the vehicle must have been fixed. And it is indeed, as may be seen in the latest additions to the tank arsenal—the *MBT 70*, the *Leopard*, and the *AMX*.

NT OF FIGHTING VEHICLES

Reviewed by
DOCTOR M. G. BEKKER



Doctor M. G. Bekker is now engaged in ground mobility research at the AC Electronics Defense Research Laboratories, General Motors Corporation, Santa Barbara, California. He has been Chief of the Land Locomotion Research Laboratory, U.S. Army Ordnance Tank Automotive Command; a staff member of the Operations Research Office, Johns Hopkins University; a research professor in the Stevens Institute of Technology Graduate School and head of their Motor Vehicle Laboratory; a special lecturer at the School of Engineering, University of Michigan; and head of research in vehicle mobility, Canadian Department of National Defense. His numerous articles and papers have been published by the leading American and international professional magazines. He is the author of two books: *Theory of Land Locomotion*—*The Mechanics of Vehicle Mobility and Off-the-Road Locomotion*—*Research and Development in Terra-mechanics* both published by the University of Michigan Press. His third book entitled *Introduction to Terrain-Vehicle Systems* will be published this fall also by the University of Michigan Press.

He did an extensive analysis of terrain-vehicle systems and developed new concepts of lunar surface vehicles under the sponsorship of the Jet Propulsion Laboratory of the California Institute of Technology and the National Aeronautics and Space Administration. He helped to establish the Land Locomotion Laboratory at the Army Tank Automotive Command and to develop concepts of articulated vehicles.

Dr. Bekker is a graduate of the Warsaw Institute of Technology, a retired lieutenant colonel of the Canadian Army, and a founder of the International Society for Terrain-Vehicle Systems. An international authority on cross-country locomotion, Dr. Bekker has been extensively honored in the United States, Germany, Italy and Sweden.

It should be noted, however, that in this climate of relative stability of doctrine and technology, the environment has remained most unstable, if under the term "environment" we understand not only the terrain, but also the battlefield infested with hostile firepower.

Although Ogorkiewicz describes the steadily growing firepower and its winning race with armor protection, he does not emphasize strongly enough the development of new ordnance and new ways of fire

delivery in anti-tank combat, target acquisition, and battlefield surveillance, all of which may change the environment to such an extent that the present "species" of tanks may become extinct or evolve into another conceptual framework.

The possibility of this outcome may be seen in the environmental changes introduced by air-delivered weapons alone. The fact that 600 tanks were destroyed mainly in that manner, in four days, during the Israeli-Egyptian war, has brought about much thinking as to the future of conservative weaponry. As General Howze put it, in a slightly different though relevant context, "Armor might well prove to be a transitory title" (*Armor*, Jan-Feb, 1968).

The concept of the armored vehicle Ogorkiewicz visualizes, however, is not incompatible with this threat. He emphasizes that tanks are merely mobile weapon platforms, to a far greater extent than they are armored vehicles. In consequence, their effectiveness is not primarily a function of their armor protection, but of their ability to make heavy weapons more mobile, and therefore more effective. This definition of the tank role puts Armor conceptually on a par with other weapon platforms such as aircraft or helicopters, and frees them from what some of the students of the problem call the obsolescence of the battleship.

In this approach there is less concern for developing the vehicle as such (since engineering can cope with the problem), but there is more emphasis on the integration of weapon systems and on the optimization of their mixes. This is visible in modern managerial methods and system analyses that are already taking the place of debates by various committees which used to lay down requirements for a tank. Thus, the dilemma described by Ogorkiewicz as to the role of the user and engineer is gradually being resolved by interdisciplinary and interservice programs that include everybody concerned, and are devoted to the optimization of the system as a whole.

Rationalization of such programs is a complex task, but the accuracy of predictions and weighing of alternatives steadily improve as everyone concerned gains experience, and acquires better inputs and techniques.

In this undertaking, a work such as "Design and Development of Fighting Vehicles" is of great help since it teaches the lessons of the past, and advances concepts of armor that are not incompatible with concepts that may be required to meet the challenge of the changing environment of the battlefield.

Christmas Is Special

by Marion Leach

'Tis said that Christmas is many things to many people. But what is it really to the family moving about in the Army? Can it be much to those who know few Christmases in the same place or with the same group of people? Indeed it can, for Christmas is more of everything to the Army family.

Certainly it is a deeply religious season when Army families of every faith find religious expression through chapel services and activities. But Christmas for the Army family is more than a holy season; out of this time of joy and celebration comes the development of traditions, individually styled and personally patterned.

Army structure is based on tradition and many an Army family seems to follow the same guidon. Each family has its own customs stemming from both its background and the many places Army orders have

placed it at the holiday season. Somehow these features all meld into something wonderful. Christmas for an Army family is truly a special thing.

What makes this so? Entertaining for one thing. Holiday times is almost synonymous with "open house," "eggnog" and "please come." Christmas is a time of giving—parties not excepted. And, what lovely things are dreamed up by Army hostesses. It's the season for sharing the bounty of the kitchen and many are the tasty offerings lovingly prepared and served to guests. Eggnog, hot spiced tea, fruit cake, pound cake, buttered ham biscuits, sugared dates, Yule logs of cheese, glazed nuts, and every bite a good home-made one. Special, treasured recipes are used; many reflect a region of our nation or bear the unmistakable imprint of a country lived in and loved. And so it becomes a custom to have an annual "open house" in any house that billeting assigns.

An open house at holiday time means, for the Army family, more than just a two-hour period for friends to call. Much of the fun is in the preparation. No one prepares for the holidays like the Army. Whether plans call for entertaining friends *en masse* or just having a couple in to visit, the house wears its holiday dress like a princess before a ball—sparkling, brilliant and with an air of anticipation. Even the dreariest of quarters become elegant.

From the depths of foot-lockers and out of cartons, the Christmas finery is unearthed and lovingly placed where it shows to the greatest advantage. Army families are often pack rats and even more so about the things they use to make Christmas special.





From the well-worn stockings to hang to the gorgeous golden angel, bits and baubles are cherished, saved, packed, moved and brought out again and again to adorn each new home.

There are the old favorite decorations and then there are the newly added for a number of reasons. One may be the custom many Army families follow of purchasing annually something which the whole family will enjoy with the idea that it will become a part of the permanent collection. A holiday tablecloth, a della Robbia wreath for the door or candelabra of brass or wrought iron fall into this category. Some things are acquired because the family lives where new and different things are made and used, like the papier-mâché of Mexico, the straw and wooden ornaments of Scandinavia, the hand blown, hand decorated balls of Germany or the delicate artistry of the Orient. A little of each is added and before very long a real collection is made.

A number of Army families have the custom of allowing each youngster to buy one ornament (of his very own choosing) each year. These are carefully labeled with year and place of purchase and soon make a fascinating hobby. Tree decorations are as varied as the Christmases spent and often compose an international display just short of a museum.

One family collects tiny bells representative of different countries, another angels. The search is exciting and when hung on the tree, or displayed as a group, these trimmings are the delight of all. Nativity scenes appear frequently in Army Christmas quarters—the wooden hand carved Italian, the softly

colored German Hummels, the delicate white bisque, the old one grandmother used or one of ceramic, molded and painted by the Army wife herself—each in a place of honor.

The tree, so handsomely adorned, is a thing of joy. And, Army people certainly enjoy an infinite variety of types ranging from the prickly cedar cut on the reservation and chosen by the whole family to the majestic fir straight from the Black Forest. All are trees loved and remembered as “the tree we had at Leavenworth” or “the one at Fort Knox.” Each one is prettier than the last and with all those ornaments, a little bigger, too.

At Yuletide, the Army house, decorated and waiting, is also filled with the sounds of Christmas. Both kitchen carols and Christmas carols fill the air as joy spreads from the cookie baking to the stereo and



tape. Songs of the season from home and abroad are a part of the treasures that make the holiday season so meaningful to Army families. Carols sung in French or German or Korean and played by ensemble, full orchestra or antique music box become a part of the Christmas heritage of an Army youngster. And more often than not, he can join in the singing.

Somewhere to be seen is the evidence of one very precious holiday custom, cherished by all Americans—but especially by the military—namely the Christmas greeting card. Army wives display them in baskets, buckets, and bowls; hang them on screens, in garlands and around doors; and, all are read with interest and delight. Christmas is a time for catching up with one's friends, discovering where they are and learning what's new with them.

The Army wife keeps a card file of addresses and brings them up to date during the comparatively dull post-holiday time. And, then too, she often writes a note to the once lost friend now re-discovered. (And if she was too busy baking, decorating and preparing before Christmas, she writes her cards in January or maybe even March!) Army couples enjoy the personal notes on their cards for they express a warmth of friendship and an abundance of good cheer in a very special way. The exchange of greeting cards has really become a custom of the service despite the fact that this is often discouraged among personnel on the same post. Today, more than ever, the Army family looks forward to this once a year contact with old and dear friends.

Christmas for the Army household is special in another way too. It is a time for creativity and the season quickens the imagination of the entire family. Even the youngest want to make and do for others. And their accomplishments, with mother's help, can be surprisingly charming. The simplest of gifts take on meaning when lovingly made and carefully and surreptitiously wrapped. Older family members, more adept, prepare for the holidays too, making gifts and decorations, many of which are soon on their way to being heirlooms as they are kept from year to year. This is especially so if their creation resulted from necessity when everything else was in storage! The Army wife bakes all the delights she knew as a child plus those she liked at an open-house somewhere (and pried loose the recipes). And too, there are nearly always some with a foreign flavor. Some are packaged and wrapped for gift-giving to friends and neighbors. Even the wrapper may be a stroke of creative genius.

The Army wife goes creative in other areas too and makes the most fetching of gifts with needle and thread, paper and paste, felt and sequins and—love and kindness. The head of the house is not to be outdone and it is he who generates the outside decor of lights and greenery. He may decide to trim the door and in his own inimitable way transform it into Rudolph the Red Nosed or the Jolly Old Saint! (One Armor colonel made a Santa that more closely resembled a tanker than the merry old man himself!).

Home has strong attachment for the military family and it is not uncommon at all to travel half-way across the country and back again just to be "home for Christmas." There is a special delight in being among those who can say: this year to grandmother's house we go.

What about Christmas on the move? This, too, happens and the Army family takes it in stride and enjoys a miniature dime store tree in a motel room and pocket sized presents and lists of things to come. One family recalls Christmas on a ship as one of the most deeply religious and movingly American.

Christmas is where you find it and Army people find it in their hearts wherever they are. In state-side or foreign quarters, on or off post, the spirit of Christmas prevails wherever the Army family hangs up its Christmas stocking. It is hung with reverence and thanksgiving, with tradition and modernity, with joy and excitement and above all with a sense of togetherness amongst the family and cherished Army friends. Ask again, what is Christmas to the military family moving from place to place and the answer comes back clear as a sleigh bell on a still, snowy night—Christmas is special!



CAVALRY OPERATIONS

II — GARRISON PREPARATIONS

by Lieutenant Colonel Raymond R. Battreall, Jr.

The first article in this series introduced Cavalry operations. This one will discuss initial planning for an operation: planning that you probably never see on an OPLAN but equally essential to the success of an operation. That is the continuous garrison planning and drill that becomes habit and enables us to move out in an orderly, professional manner with the least amount of confusion, with all of our equipment and with troops who have what they need when they get where they are going: planning and drill that eliminates chaos and panic.

Before you decide that this is just another example of the "military mind" at work prescribing step-by-step procedures for such a simple thing as getting out of bed and driving to a well-known assembly area, ask yourself a few questions. In a unit that has *not* developed detailed plans and procedures:

How do the men know what type of emergency or drill is going on?

How do the men draw and sign for their weapons, bayonets, and protective masks? Is there a faster way?

How are bottlenecks avoided at arms rooms, supply rooms, kitchens, dispatch offices, and similar places?

What happens to deadlined vehicles, their crews, their weapons and OEM?

How much equipment is carried how far, and by whom from billets to motor park? Is everything located in the best place to speed movement?

Who is responsible that nothing essential is left behind?

What happens to the vehicle whose driver is on

pass? Who runs the squad whose squad leader is absent?

How do you as leaders answer these and similar questions? First of all, you must understand exactly what your superiors expect of you in each foreseeable situation—readiness tests, musters, various types of real emergencies. Ask questions until you are sure you understand your mission. Then assemble your subordinates and pass the word on to them, making sure that they too ask questions until they understand.

The next step involves long, careful thought resulting in written, step-by-step instructions for:

► **The Charge of Quarters.** The CQ should have blank forms on which to record emergency messages from higher headquarters to insure that all necessary information is received and that both he and the troop will know what is going on. These forms should provide, as a minimum, for recording the originating headquarters, effective time, time received, from whom received, the type of test or emergency, and special instructions. The CQ must then know precisely whom he is supposed to notify, how, and in what order. Probably the best system is to have the CQ runner start telephoning off-post personnel in accordance with your emergency notification plan while the CQ uses whatever alarm system you have to awaken and assemble the troops in billets.

► **Off-post personnel.** Each man living off post must know exactly what to do. Does he notify other off-post people? If so how, and what does he do if

The author, Lieutenant Colonel Raymond R. Battreall, Jr., receives the Legion of Merit for meritorious service as commanding officer of the 3d Squadron, 3d Armored Cavalry Regiment, from Major General William W. Beverley, Fort Lewis commanding general. Colonel Battreall is now executive officer, 4th Regiment, U.S. Corps of Cadets, at West Point.



one or more can't be reached? Is he expected to have field uniform in his quarters? Where and how does he get the rest of his equipment? How soon and by what means is he expected to report to the unit? If private autos must be left, say, for the possible evacuation of noncombatant family members, what car-pool arrangements are prescribed or where does he meet government transportation? What must he do upon arrival at the unit?

► **Personnel in barracks.** Here it is best to assemble everyone in the halls and issue instruction cards to the senior NCO present from each platoon. These cards should be check lists of the various things to be done—dress in prescribed uniform, draw weapons and other gear not already issued, provide certain necessary details, move men and equipment to the motor park—and the sequence in which to do them. The sequence should be different for each platoon to avoid congestion. For example, one platoon should report to the arms room in skivvies to draw weapons while other platoons are dressing.

► **Key specialists.** The mess sergeant, supply sergeant, armor, motor sergeant, and other key men each require their own instructions. What gear must they issue, load, or move? What assistance will they receive from whom? How will sensitive items be accounted for without delaying the unit (as, for instance, a single pre-signed receipt card carried by each man and exchanged for weapon, bayonet, and protective mask all together instead of the time-consuming process of signing for each separately)?

You have thought all this out. Instructions have been prepared and issued, and your people comply with them. The troopers are now ready to leave the billets for the motor park. Hold it! Not every man for himself or chaos will result. Be sure that your unit moves in organized groups—at least by crew, preferably by section or platoon—so that your sergeants can maintain control.

On arrival in the motor pool the results of still more planning must go into effect. The vast bulk of equipment—personal gear, OEM, basic loads—must go on the vehicles in accordance with carefully prepared loading plans. If you don't have them, the stuff simply won't all fit, and finding a particular item later will be like hunting the proverbial needle in the haystack. Pre-loading of everything possible, of course, saves much time and effort.

When all this is done, it's time to check on the presence of normal attachments such as medics, FO party, fuel tankers, run a last minute inspection for essential individual equipment; open the radio nets; and report the unit ready to move. How long did all this take? Less than an hour.

A well-trained squadron can clear the combat and control elements of all five troops and the battery through a single exit gate in fifty minutes—trains elements in an hour and a half—from the instant an alert is called.

It can be done, but only if all of the questions posed here have been answered in a complete and thorough plan which is known to all. Here as in everything we do, only deliberate planning can lead to violent—and effective—execution.

MAN IN THE



THE BATTALION EXECUTIVE OFFICER

lieutenant colonel lewis s. sorley, III

It was getting dark quickly in the Highlands as I sat on my duffel bag at New Pleiku air base and waited for a vehicle. I was headed for a new job as executive officer of a tank battalion, and for weeks my mind had been filled with questions and ideas in anticipation of the opportunity.

As I worked over a cold can of C rations I thought again of the nebulous nature of the exec's duties which are much less definitively spelled out in regulations and training publications than those of his staff officers. I tried to remember the various execs I had served with and how they had handled the job. No clear pattern emerged as I recalled those diversely successful officers. But they had in common an uncommon flexibility, and I concentrated on this as I spotted a pair of headlights turn down the edge of the strip and head my way.

It was well that I had flexibility in mind as the jeep bounced up to the darkened command post. Nearby, crouched over a great furry bulk in the lights of a ¾-ton truck, I found my new battalion commander — skinning a tiger.

"What can I do for you?" he asked, concentrating on a forepaw.

"Sir, I'm your new executive officer, reporting for duty," somewhat uncertainly.

"Good," with relish, "lend a hand," and I had my first mission as a battalion exec.

Not all the exec's missions are as clearcut, or so simple, direct and active in execution, but they are all alike in being tied closely to the commander, his desires and policies, and especially his actions. No successful exec can lose sight of this fundamental. Many of the exec's missions he will deduce, rather than receiving them directly from the commander, but all will be in some way a function of what the commander is doing. In some cases the exec will supplement the commander's emphasis on a problem area, such as vehicle maintenance or marksmanship, especially when such emphasis is tied to a major training or administrative event.

But in most cases the exec must resist the visceral impulse to jump on the bandwagon for whatever is currently of primary interest to the old man. There are several reasons for this. The staff and the troops can absorb only so much high level interest and guidance in a given area at a time, and the exec must provide the needed counterbalancing. And,

he must supervise continually the many other essential areas not then subject to intensive command interest.

Thus the lack of a precisely defined job for the exec can be an advantage, as his resultant flexibility enables him to provide balance in the direction of the battalion's efforts. This is perhaps his most important function. In concert with a fine commander this can become an almost instinctive blending of efforts for the most productive return. My own experience led to the conclusion that, like most jobs in the Army or out, the exec's is a good one when you work for a good man.

One of the primary, and specifically assigned, duties of the executive officer is coordination of the staff. Particularly in Vietnam this becomes critically important. Because of the mobility he possesses through having access to a helicopter, the exec can get around to the various elements of the battalion. Characteristically, these are widely dispersed when operating in conjunction with infantry units. It must be recognized that in an Armor unit detached elements, especially if they are with infantry, still need many kinds of support from the parent unit. This is especially true of maintenance. At one point our battalion had elements as much as a hundred miles apart, from the Central Highlands along the Cambodian border to the Coastal Plains near Bong Son.

While individual staff officers make every effort to get around to all of these scattered elements, the exec must often represent them and take the lead

in seeing that those who do go pass the word to others on matters that concern them. This dispersion, and the frequent use of oral and frag orders, require a high degree of coordination and exchange of information. The staff must talk to one another constantly. Meetings of the whole staff are a rarity. Effective coordination can only be achieved through creating a cooperative state of mind.

The executive officer rates or indorses nearly half the officers in the battalion. Therefore, it is a necessity that he keep book on them, both good and bad, to insure doing them justice when it is time to prepare efficiency reports. Too often, if this is not done, he is left with a general impression after several months have gone by that a certain officer has done an outstanding job. But, he has no specifics to back this up except a few of recent memory. Such record keeping will also enable him to recognize and reward long term improvement when it is demonstrated.

As does the commander, the exec achieves most by knowing his people and treating them as individuals. This also involves handling problems on a basis which takes the individual into account.

I recall an incident in which the S3 Air, a very capable officer, accidentally discharged his pistol in the command post. Fortunately, no one was injured. But he did put a hole through the radiator of his armored personnel carrier. Resisting the impulse to land with both feet on the culprit, I watched the situation develop. Conversation in the officers' mess tent for the next several days was liberally sprinkled with historical reminiscences about how it was the custom in the old cavalry to shoot one's horse, but *only* when it was disabled, and then in the head, not the radiator. The desired result, a severely chastened and much more careful S3 Air, followed as expected.

An adaptive problem faced by every exec, and especially the officer with high productivity who has come from a job showing concrete products of his work, is to adjust to the essentially intangible nature of what he produces. This can be frustrating, as the exec cranks out no operations orders and repairs no tanks. But once he understands and adjusts to this he learns to find his satisfactions in the responsiveness, alertness and anticipatory sense of the staff and the organization as a whole.

An understanding battalion commander can be a great help in making this adjustment. It is also eased these days by a compensating problem, the relative inexperience of the battalion staff. In most cases it is likely that staff officers at this level will be filling



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"I found my new battalion commander skinning a tiger."



MARY BURNLEY

their first staff posts. And, in many instances, they will not have commanded at company level. Thus the exec assumes an important role as teacher, and this is not necessarily a disadvantage.

We have a multitude of fine young officers with initiative and imagination. In conjunction with the indispensable technical knowledge of the warrant officers and senior non-coms, the exec can build his staff the way he wants it. And the willingness and adaptability of the young officers often permit achieving a high degree of unanimity and common purpose in a surprisingly short time.

In addition to compensating for the generally restricted level of staff experience, the exec is also in a position to put emphasis on specific areas of staff inexperience. In Vietnam a good example is the S5 program, where having trained and experienced personnel is unlikely at battalion level. Second only to the selection of good people, the backing and continued interest of the exec can be critical to making progress in such areas.

The exec points the way in adjusting to unique situations, such as that in Vietnam where there is the necessity of maintaining a base camp as well as field positions, with resultant juggling of personnel and equipment. Although the exec has many interests in the base camp, he will probably want to work

out of the forward command post, and make frequent visits to the base camp. We worked this out by appointing our headquarters company commander, a very efficient and energetic officer, as base camp commander. He handled day to day direction of the battalion's elements there with excellent results.

His finest day came when we moved our base camp to Dragon Mountain. Most of our gear went in Conex containers or truck beds, but we decided to move the "Officers' Club," a standard wood and screen shanty, intact on a flat bed trailer. Affixed above the front door was a large green and yellow Armor insignia, which flashed boldly as the headquarters commandant led it through the gate at Dragon Mountain. Proudly he supervised the unloading of the club on the designated new site, only to have pride turn to dismay as the trip-loosened joints slowly gave way and the club settled gracefully into a horizontal heap. The troops, though, were positively delighted, and the resulting hilarity had to be one of the biggest morale coups of the tour.

The movement of the base camp provided other interesting problems in clearing the old one as well as constructing facilities in the new. One day I was in the old base camp during a lull in operations and was just preparing to have lunch before returning



MARY BURNERY

... a road was coming through the exact spot where battalion headquarters stood

to the field when a frantic message came announcing that we had to move the battalion headquarters building by 1300 hours, as a road was then coming through the exact spot on which it stood. Thoughts of Snoopy atop his doghouse waiting for the bulldozers crossed my mind. Not knowing what else to do, I sent back an answer that was short, direct and pungent. We went to lunch, keeping a transparently uncasual eye on the headquarters through a tear in the canvas as the appointed hour came and went. Nothing happened. While I do not recommend it as a method of operating, this was one of the few cases I have encountered of successfully ignoring a problem and having it go away.

Every unit resolves for itself the question of how deeply involved in operational matters the exec is to become. The problem is, surprisingly enough, probably least troublesome in combat. There is usually an easy transition back and forth between commander and exec, and the operations officer as well, as the commander's temporary absences from the immediate operational area (such as hospital visits or higher level command conferences) pass functional control to one or another of his senior assistants. Their familiarity with the situation and the commander's philosophy permits them to handle events in his absence much as he would himself,

and with no disruptive discontinuity in the effort.

It is very helpful in bringing this about to have periodic briefings. At these the commander can discuss informally his view of the situation, the possibilities he sees developing, and his tentative ideas on how he will handle them. The exec can set this up with good results for the staff.

Whether the exec functions in effect as a deputy commander at battalion level is entirely dependent on the commander's desires. It should be pointed out that many such discretionary arrangements are never really articulated. Rather, they evolve naturally from the developing relationship between the commander and his exec as they get to know one another and arrive at a comfortable working relationship. From the exec's standpoint, the ground rules are much like any job: good performance results in trust and freedom of action, with the increased opportunities for more important contributions which these bring.

Self-discipline becomes of great importance to the exec when he turns to administrative matters. Distasteful though it will be to most vigorous officers, especially when the unit is in combat, detailed attention must be given to the accuracy and timeliness with which logistics management, military justice and personnel administration paperwork is prepared and processed. The sergeant major is invaluable in this, as in many other areas. His wise counsel may very well be the exec's most important asset.

As the exec involves himself personally in critical exercises affecting efficiency and morale, such as the selection of personnel for promotion, he draws heavily on the battalion's senior non-coms. I did this in part by acting as president of a board also consisting of the sergeant major and the first sergeants. In addition to selecting soldiers for promotion on a basis acceptable to all, the sessions gave me an excellent chance to talk over with these experienced soldiers problems affecting the battalion as a whole. Often they were able to anticipate upcoming problems so we could head them off. In retrospect, I wonder whether they knew how much they helped me or how great was my respect and affection for them.

On a continuing basis the sergeant major provided a fund of common sense that often made it necessary only to acquaint him with a problem to see it solved. No difficulty need arise from the fact that the sergeant major works directly and solely for the battalion commander. He will respond professionally to the challenge of the battalion's prob-

lems and to opportunities to employ his experience and insight.

Keeping informed is an absolute necessity for an effective exec. Frequent contacts with the commander, including daily joint stock taking if the tactical situation permits, give an opportunity for exchange of information, discussion of upcoming events, anticipation of problems, and derivation of missions. With regard to what comes into the outfit in writing, battalion is probably the highest level at which it is possible for even a very vigorous and efficient officer to see every paper that comes in.

The adjutant keeps a suspense file, of course, and the exec backs it up by establishing presuspense review when necessary. He works out with the adjutant what he wants to see, both incoming and outgoing. This is a function of both the staff's experience in general and the demonstrated abilities of its individual members.

Normally a tour as exec will include at least one change of command in the battalion, since most units try to achieve greater continuity by staggering the replacement of CO and XO. This is in many ways the most important phase of the exec's tour. At that time, he is in a position to make all the difference in the smoothness of the transition and in moderating the disruptive effects of the new commander's inevitably different way of doing business.

By looking at the event from both sides, the exec can help the new commander achieve and begin to exercise effective control as rapidly as possible. He does this by insuring that the new commander is briefed, shown around and introduced to key personnel, both within the unit and at supporting and higher headquarters. The exec can help the unit respond to the new direction without undue dissipation of adaptive energy by relating new concepts to already understood and accepted ones. And, he can put in perspective the inevitable minor strains and misunderstandings that occur until people get to know one another and establish a climate of mutual respect and professional regard.

Involved as he is in some degree with almost everything the battalion does, the exec must expect and learn to handle some failures. This includes recognizing when to let a bad idea quietly die a decent death.

I recall a time, during a slow period, when we decided to make an "event" of our mortar platoon's firing its 15,000th round during early evening H&I fires. This was to be complete with photos of the battalion commander dropping the round down the

tube. With everything in readiness, and impact planned for the forward slope of a nearby hill mass, the CO was summoned and dutifully stepped up and did the honors. I was careful never to mention the results, which were round lost, photo same. Mercifully, the battalion commander never asked for any prints to send home.

Finally, when it comes time to move on to the next job, some thought should be given to the incoming exec. Emphasis should be on remembering the problems of your own transition period. Ideally there will be a period of overlap, a brief one, but this is not always possible. In any case it is important to pass on to one's successor information about matters pending, local idiosyncrasies, and contacts for doing various kinds of business.

This should be in writing, because even if there is an overlap he will have enough to do getting his feet on the ground the first couple of days without trying to absorb a mass of unfamiliar data presented orally. Give him something he can look back over from time to time. And, insure that your staff officers render their replacements the same courtesy.

Most published guidance points out that the exec coordinates the staff. This he does. And he teaches them, too, when necessary. Less often recognized, but equally significant, are his responsibilities for providing balance in the direction of the battalion's efforts, drawing on the experience and insight of the senior non-coms, and stabilizing and providing continuity during a change of command.

Many more specific aspects could be discussed, some of them unique to certain outfits. But perhaps most important is that the job is extremely fluid. There is not a routine that can be established and followed if the work is to be done effectively. Rather it is a matter of continual reevaluation and shifting emphasis as the mission changes, or the relative importance of portions of it does, as new staff officers join the unit, and so on. This continual flux is at once the most challenging and the most enjoyable aspect of the job.

To be a success, the exec must recognize the adaptive nature of his mission and work out the most productive role for himself. He should be an innovator, seeking long term improvement as well as day to day competence in handling the affairs of the battalion.

In reflecting upon the assignment, it is my conclusion that, while there is no substitute for command, a tour as executive officer of an Armor unit can be both enjoyable and professionally rewarding.

AN ADVANCED SYSTEM

FOR

TANK DRIVER TRAINING

by Major General H. S. Wood, C. B., T. D., British Army-Retired

Photos and Illustrations Courtesy of the British Army

There are many people who firmly believe that artificial training aids are a waste of time and the only way to become really proficient with any military equipment is by constant and regular use of it. Actually, this view is nearly as far from the truth as the belief that all training can be done with artificial aids.

Artificial aids can be developed to various degrees. At one end of the scale they can be extremely simple, cheap and perhaps quite unrepresentative of the actual equipment for which they train, provided they develop an expertise which is required in the operation of that equipment. On the other hand they can be highly complex and costly, reproducing the tank or aircraft they represent so exactly that the soldier being trained very soon forgets that he is using a training device at all. The degree to which trainers are developed will depend on the equipment they represent and the extent of the training which is required.

The need for trainers can be summed up in one word—ECONOMY. This does not mean just lower initial and running costs (although, of course, almost all aspects of training can be related to cost) but economy in time, effort, utilization of training areas and general facilities. In general, it can be said that if a piece of military equipment is costly to buy and operate, if it requires a large and skilled maintenance backing and can be extensively damaged by inexperienced handling, the development of artificial training aids for it is worth considering. The modern tank is certainly in this category.

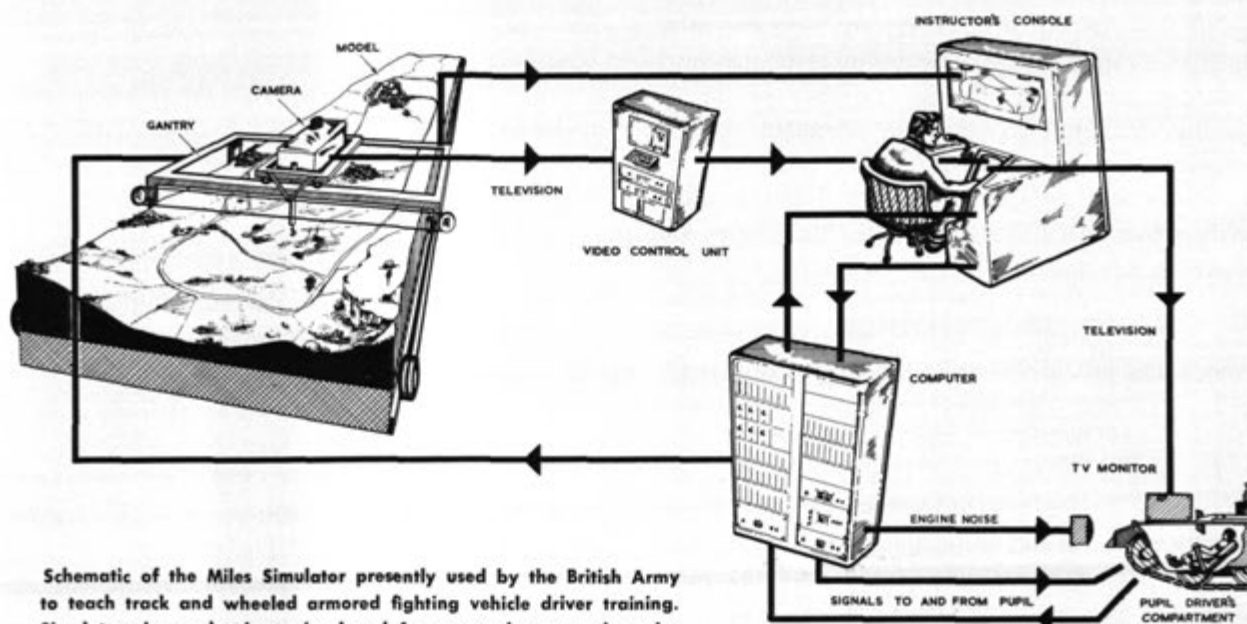
This article is concerned with the very realistic type of trainer which is generally termed a *simulator*

as it reproduces or simulates to a very high degree the equipment for which it trains. The advances in the field of electronics, which have produced computers and closed circuit television systems of high standards and efficiency, have made it possible to develop these simulators at a reasonable cost and with confidence that they will be thoroughly reliable in a service environment.

SIMULATORS

Simple driver training aids have been in use by the British Army for many years but the true driving simulator of the type now in extensive use in the aircraft field is comparatively new. A driving simulator for the *Chieftain* tank was developed by the Miles Group of Companies at Shoreham-by-Sea, Sussex, England, and installed at the Royal Armoured Corps Centre at Bovington, England in 1965. A second one has been in regular use at the Driver Training Centre at Catterick since the early part of 1967. Moreover, the same company has developed and installed a simulator for the *FV432* armored personnel carrier and the *FV433* Abbot self-propelled field gun at Royal Corps of Transport Centre at Bordon.

The British Army's four years practical experience with these simulators has shown that they not only save money but, when properly integrated into an overall training program with the vehicle itself, have a number of other major advantages and provide a host of fringe benefits which continue to come to light as more experience is gained with them. The five major advantages which have so far shown up are:



Schematic of the Miles Simulator presently used by the British Army to teach track and wheeled armored fighting vehicle driver training. Simulators have also been developed for armored personnel carrier and self-propelled gun drivers.

Financial Saving

There are two aspects of this which will be dealt with in more detail later and these are:

Initial cost The cost of the simulator is between 50 and 60 percent of the tank itself. And, given reasonable usage, a single simulator can provide an amount of training for which at least two tanks would be required.

Running costs The cost of operating a simulator can vary between a quarter and a tenth of the cost of operating the tank, depending on the model of tank and the degree of simulation required.

Saving in training time

Learner drivers on the simulator are less afraid of damaging themselves and the equipment than they are in the tank itself, so they learn quicker. The simulator is almost always available and can be used continuously for upwards of fifteen hours a day. It is independent of weather and daylight, planned training programs can almost always be met, and driver through-put is of a very high order.

Produces better drivers

All normal tank driving events can be simulated as well as very rare ones, so that the driver's training can include experience of anything he is likely to meet in practice. The instructor can exercise better and closer supervision, demonstrate how a

difficult maneuver is undertaken and, by his ability to feed in faults, instill in the driver a basic instrument consciousness which enables him to anticipate and prevent many would-be troubles. A combination of approximately equal time on the simulator and the tank itself provides the best balance in training and this, of course, reduces the tank usage by approximately a half.

Eases the maintenance load

By using a simulator, learner drivers acquire some skill before they attempt to drive a tank and are, therefore, less likely to mistreat it. Fewer tanks are required for training and fewer skills are required on the more easily maintained simulator. For these reasons there can be significant saving in the highly skilled maintenance manpower.

Training area economy

Heavy tracked vehicles can do enormous damage to training areas, which are often difficult to come by and restricted in what they offer, and to public roads leading to those areas. Any type of terrain can be included realistically in the simulator and by reducing tank usage more economical use of existing tank training areas can be made and a much broader training given with correspondingly less damage to public highways.

In addition to these major advantages there are many minor ones and more are being discovered as the simulator gets wider use. For example, it is

found that trained drivers who are on some other duty and rarely have the opportunity of driving a tank can, by spending about one hour per month on the simulator, maintain an adequate level of practice. In addition to everything else, it is an attractive and enjoyable form of training which soldiers like. All these advantages, both major and minor, justify the need for these advanced trainers which at first sight appear expensive but which, on closer investigation, are seen to save large sums of money and produce more highly trained drivers.

DEVELOPMENT OF DRIVING TRAINERS

The British Army has in the past relied almost exclusively on the vehicle itself for training drivers of both armored and soft-skinned vehicles. Various trainers have been considered but until the Miles Simulator was produced, the only one actually in use was the extremely simple Static Trainer—a box-like structure containing a single seat, steering column, gear shift, handbrake, footbrake, clutch and accelerator pedals and driving mirror, representative of the Army's three ton truck. This trainer enabled the driver to practice the correct "drill" of driving and to familiarize himself with the layout of the controls, but no more than that.

In recent years trainers of this type which display a film in front of the driver, synchronized with his controls, have been considered. These have not been adopted, largely because the driver is then limited to relatively narrow confines, such as a road, whereas service requirements are that he should, at times anyway, have complete freedom of movement.

The Miles Simulator was developed to a General Staff requirement as an advanced trainer for the *Chieftain* tank and will be described in more detail later. Two of these are now in service.

The *Chieftain* Simulator has been followed by another one on the same principle but for the *FV430* Series of AFV's (the APC and SP gun). While employing the same basic principles, the simulators differ in two respects. Firstly, being developed for different vehicles, the characteristics and physical layout of those vehicles are built into the simulator. And secondly, as the state of the art has progressed, more advanced techniques have been incorporated in the later ones.

Now that the techniques of this system of simulation have been mastered, and the systems themselves proved by service use, it is a logical and simple step to develop simulators for other tanks.

Most of the other main battle tanks of the world have been studied and designs have been prepared for the German *Leopard* and the *Vickers MBT (ARMOR, January-February 1968)*. *MBT70* has also been considered and can likewise be simulated with little difficulty.

THE MILES SIMULATOR

The principle on which the simulator operates is a very simple one. A model tank is driven on a terrain model from a driving compartment. The driver in this compartment sees what he is doing through a closed circuit television system. A computer governs the effect of the driver's controls on the model tank and the instructor monitors the whole procedure from his console. (See diagram.)

The component parts of the complete system are:

Terrain Model

This 1:300 model of selected terrain is made accurately to scale and in great detail. The normal model covers approximately two miles by three-quarters of a mile and includes paved roads, villages, woodland, open country, as well as a special tank training area with a variety of obstacles. This is always built to customer's requirements. A model tank in the form of a flat shoe is made to move in any desired direction through a gantry system. Limited vertical movement is also required, as the model is contoured, and this is achieved by transducers which drive a servo to raise and lower the shoe, keeping it always in contact with the surface of the model whatever the position and slope.

Driving Compartment

The driver is in an exact reproduction of the driving compartment of the tank. Great care is taken to reproduce exactly the parent vehicle and a high degree of realism is achieved. All controls, seats and instruments are from the vehicle itself, correctly mounted in their relative positions. The controls are loaded so that they require the same effort to operate and have the same feel. The instruments indicate correctly according to control setting, i.e. rpm, road speed, oil pressure etc. The construction is metal clad wood to preserve the feel of metal without the weight. And, as the vehicle is driven, the noise of the engines, transmission and so on is synthetically generated and fed into the driving compartment. Closed-hatch driving is accepted as normal and the driver uses the tank's driving optical system.

Television System

The driver views the model and the movement on it through a closed circuit monochrome television system of 625 lines. A small mirror, mounted at the correct scale height on the shoe, looks ahead at the model over the appropriate field of view, and what it "sees" is conveyed through an optical head into a television camera and displayed on a television monitor mounted in front of, and above, the driving compartment, where it is viewed by the driver through his periscope.

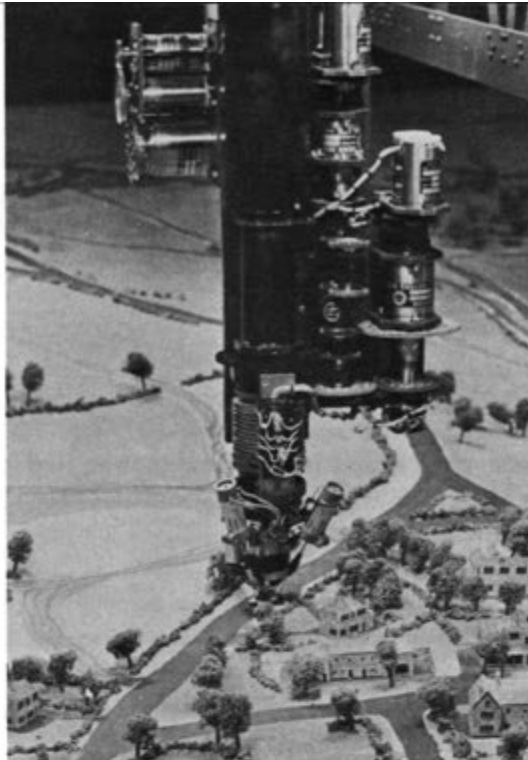
Computer

The effects of the driver's controls reach the model through a computer, in this particular case an analogue system using transistorized D.C. amplifiers and servos. The computer system is designed for the particular characteristics of the vehicle being simulated so that as the driver accelerates, steers, changes gear and brakes the appropriate signals are applied to the servos driving the shoe and to the driver's instruments. The computer also reacts to certain other signals which can be fed in by the instructor and these can effect either the shoe movement or the driver's instruments or both.

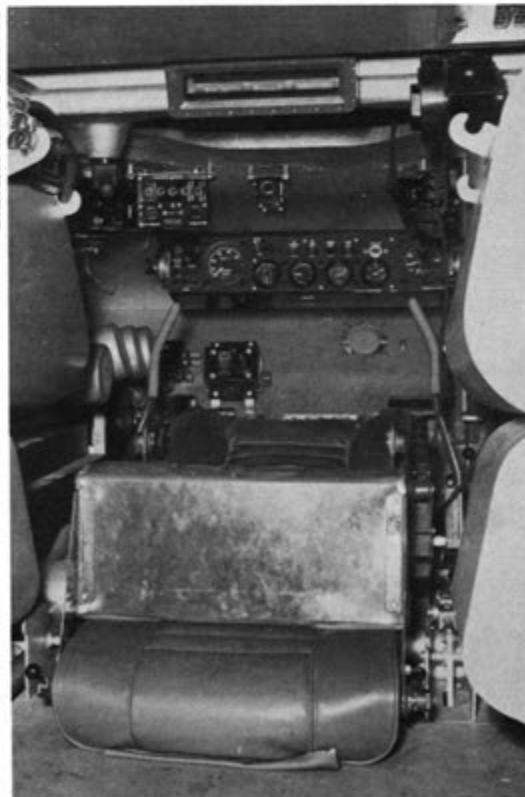
Instructor's Console

An instructor's console completes the simulator. It includes a 1:3000 scale map of the model on which a spot of light indicates the position of the shoe on the terrain model and a television monitor which presents the instructor with the same view the driver has. Duplicated driving controls allow the instructor to take control at any time if the driver gets into difficulty, or to demonstrate how a difficult bit of country should be tackled. The instructor also has an emergency stop button with which he can cut off power to the gantry if he considers there is a danger of damage to the equipment. The instructor also has a duplicate set of driver's instruments and a bank of tell-tale lights so that engine conditions are always displayed to him, a control which alters the "going" from hard road to soft mud, a fuel level control, and a faults panel. The faults panel allows him to feed in all the faults

An optical head (above) of a television camera permits the driver to view the terrain model through his periscope as though he were actually driving through the area. Meanwhile, the instructor at his console (center) may take control at any time to demonstrate how a difficult bit of country should be tackled. The Chieftain tank driving compartment (below) is reproduced exactly for realistic instruction.



BRITISH ARMY PHOTOS



which would occur with the parent vehicle, including such things as loss of oil pressure, engine overheating, etc. In addition, he has a fire warning which sounds in the driving compartment and only cuts off when the driver has carried out the correct fire drill.

The three simulators which have been made and delivered to the British Army have been made to the same basic pattern which was governed by a training value/cost balance and which is now five years old. As the simulator stands, it is a reliable and valuable piece of training equipment with many years of satisfactory service ahead of it.

Based on experience gained, a number of additional features can now be embodied whenever they are wanted. These include driving compartment motion to provide physical cues, color television in place of monochrome and an automatic application of rolling resistance (at present done manually) together with surface frictional values and their effects on side slip and skidding. In addition to these immediately available features, active consideration is being given to the problems of introducing an effect of depth into the conventional television picture.

ECONOMICS OF TANK DRIVING SIMULATION

The driving simulator is an attractive proposition from two points of view—economy and effectiveness. It is effective because it trains better drivers in a shorter time but today it is the economic angle which is often the more important. The cost of the *Chieftain* Simulator is approximately \$145,000.

There is therefore an immediate saving in capital cost even on a one for one basis. There is clear evidence that one simulator at a training center can release at least two tanks from training commitments and still maintain the same training standard and through-put.

Each hour on the simulator is equivalent to 3.6 miles of tank running, and if a simulator gives 1350 hours of effective training a year within normal working hours (a very conservative figure), this is equivalent to 4860 miles. Practical experience indicates that two tanks would be needed to ensure this tank mileage on training in a year, whereas the simulator is capable of running over 4000 hours a year or the equivalent of about 15,000 miles.

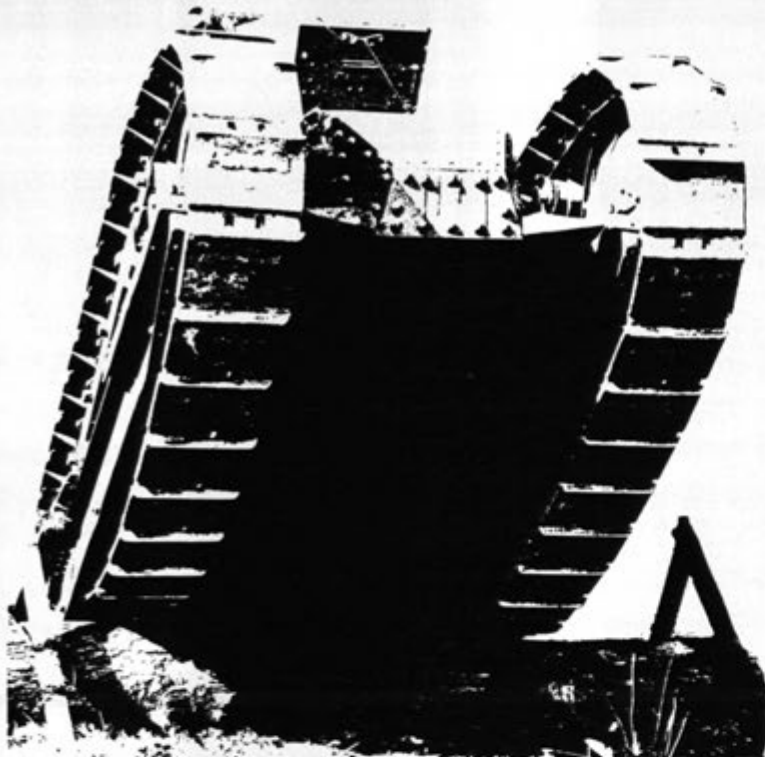
The running costs of the simulator have been estimated at \$12 per hour including depreciation. The cost, including depreciation, of operating a tank is approximately \$58. Assuming the very conservative figure of 1350 hours a year of simulator utilization, the annual saving which will result is \$62,000. A simulator would therefore pay for itself in a little over two years and show a clear profit for the remainder of its life which is a minimum of ten years.

The claim of economy is thoroughly substantiated by actual service use. When, in addition, many of the burdens of training and training equipment are removed, the simulator is seen as an advanced trainer of very great value. Where the training of a soldier is concerned, however, the acid question is: "Does it produce a more highly trained soldier?" The answer, in this case, is an unqualified "YES."

CHANGE 1 TO THE ARMOR BRANCH DIRECTORY

(ARMOR, July-August 1968)

Newly assigned Major James G. Hattersley has replaced Major Hollis D. Messer as Overseas Company Grade Assignment Officer. Major Messer moved to CONUS Field Grade Assignments to replace Lieutenant Colonel Adam Jimenez who has departed. The CONUS Company Grade Assignment Officer, Lieutenant Colonel Richard G. Graves was recently promoted to his present rank. The phone numbers for all assignment officers are OXford 6-8507/8508/8509.



The American Six-Ton Tank

by Konrad F. Schreier, Jr.

The Editor acknowledges with thanks the assistance of Colonel Robert J. Icks, AUS-Retired, who reviewed this article and contributed important facts and data from his extensive research collection as well as making available the photographs.

By the time the United States entered the First World War on 6 April 1917, the tank had already been established as an effective weapon. After the United States declared war, one of the military missions sent to Paris reported adversely on the tank. Another committee, formed after General Pershing arrived in Europe, recommended that the United States Army obtain enough British heavy tanks to equip five battalions. A five battalion set of British materiel was the first tank equipment procured for the American Army. However, the terms stipulated by the British provided that these tanks had to serve with the British Army.

By December 1917, a program to develop the Anglo-American *Mark VIII* heavy tank for use by the British, French and United States Armies had been decided upon. But this heavy tank program was never completed, and only 100 of the *Mark VIII*s were ever built. Moreover, these were built at Rock Island Arsenal in 1919 after the end of the war.

There were also a number of private tank developments underway, but none of these programs were completed. The Ford Motor Company developed a three-ton tank which was adopted, but only 15 of these were built.

Since the British and French tanks had been proved in combat and were in production, these machines were adopted for the American forces. This

led to the French Renault being adopted as the standard U.S. Army light tank.

The French *Char Leger Renault* (Renault light tank), or *Char FT* (i.e. tank FT, FT meaning *faible tonnage* or light weight) was procured by the U.S. Army in large numbers, and used in combat from the Battle of St. Mihiel until the end of the war. In addition, many considerably modified versions of the French Renault *Char FT* were built in the United States, but not in time for use in the war.

The French had done nearly as much original tank development during the First World War as had the British. The French did their work at the same time as the British, but completely independently. The first French production designs, the *St. Chamond* and the *Schneider*, were not entirely satisfactory in combat. Lack of success with these led, in part, to the development of the *Char FT*.

Prior to 1 December 1917, the French had sent four sample *Char FT*s to the United States along with a Renault engineer familiar with their design and construction and a complete set of drawings. Also, several U.S. Army Ordnance Department officers went to France to see how the French manufactured the tank.

The first obstacle to putting the French-designed tank into production in the United States was the drawings. The French used the metric system of measurement. Therefore, the drawings had to be

MR. SCHREIER is a mechanical engineer with a lifelong interest in weapons and ordnance history. Articles by him have appeared in *Ordnance, Military Collector and Historian, Journal of the Company of Military Historians* and other professional periodicals.

translated into the English system before American manufacturers could use them. Since the French built the tank almost entirely by hand-craftsmanship methods, the drawings were neither complete nor correct. Before the American drawings could be finished, one of the sample French tanks had to be disassembled completely and the measurements of each part verified.

As long as the tank had to be nearly entirely redesigned to permit its manufacture in the United States, a number of improvements and changes were incorporated in the new design. A bulkhead was added between the crew compartment and the engine compartment. A self-starter was added to the engine. The gasoline tank was insulated to make it somewhat resistant to puncture by projectiles.

The French Renault engine could not be manufactured by an American engine builder so an American Buda engine was adapted to the tank. A new gun mount was designed which would permit the use of either the 37mm cannon or the caliber .30 machinegun.

The steel-rimmed wooden idler wheels of the French design were replaced with all steel wheels. The idler adjustment of the French design required a large forging which could not be procured, so a simpler, and inferior, American design was adopted. The American design also omitted the bullet splash deflector from the front of the hull. Unfortunately, the American designed transmission and track rollers were not as good as the original French designs. And, like its French cousin, the American tank was noisy and overheated easily.

For the sake of secrecy, at first the American version of the Renault *Char FT* was called the *Six-ton Special Tractor*. In spite of its actual weight of

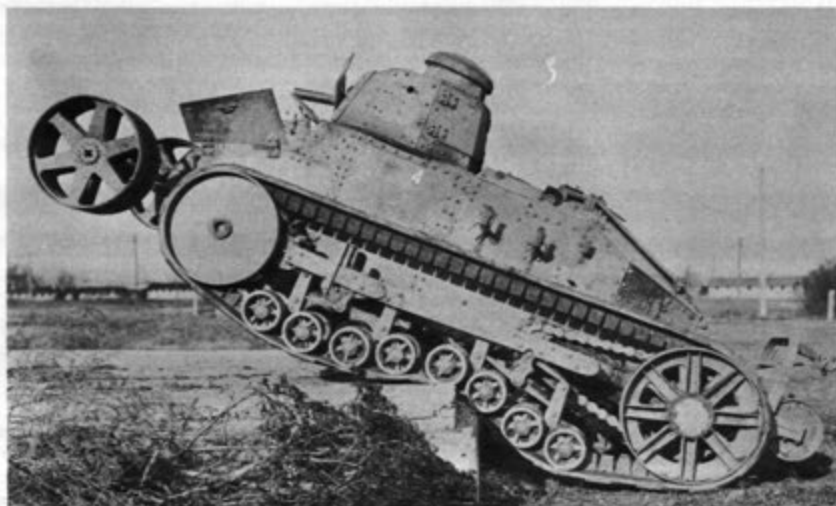


A demonstration of a Six-Ton Tank detrucking without the use of a ramp in 1927.

almost eight tons, the final official name for the American Renault was *U.S. Six-Ton Tank, Model 1917*.

The United States Government contracted for 4440 of the American Six-Ton Tanks at a fixed price of \$11,500 each. The principal contractors were the Van Dorn Iron Works, Maxwell Motor Company and C. L. Best Tractor Company. These prime contractors employed some 40 additional subcontractors to supply parts and themselves carried out the final assembly of the tanks.

The first production time estimates for the American Six-Ton Tank were very optimistic, with the tanks being promised for delivery in the fall of 1918. The first tank was completed by the Van Dorn Iron Works in October 1918. By the end of the war, on



One of many attempted modifications of the Six-Ton Tank was a rubber track for quieter operation. Photo was taken in 1925.



The Six-Ton A1 Tank with a Franklin Air Cooled Engine at the Fort Meade Tank School in 1931.

11 November 1918, a total of 64 vehicles had been completed. This remarkable feat of getting production well started just ten months after the beginning of the program was due largely to the efforts of Mr. L. J. Harwoods who was appointed civilian "czar" of the project in the late summer of 1918.

Of the 64 American Six-Ton Tanks completed and accepted by 11 November 1918, ten were actually landed in France before the war ended, but too late to see action. By December 1918, a total of 209 tanks had been completed and another 289 were in the process of being assembled. Production of these tanks was continued through the year 1919 in order to use up the supply of finished parts on hand at the end of the war. A total of 950 vehicles were built before production ceased. This supply of tanks was to fill the requirements for a standard U.S. Army light tank until the early 1930s.

All the light tanks used by the American Tank Corps in France during the First World War were French-built Renault *Char FTs*. Since the French were not able to build enough tanks to meet the demands of two armies, the American Army was never able to get to the light tank strength desired by everyone from General Pershing and General Rockenbach, Chief of the Tank Corps, down to the privates who wanted the support of tanks. However, our Army did obtain a total of 514 of the Renault *Char FTs* from the French. After the war, a few of these French tanks were shipped to the United States.

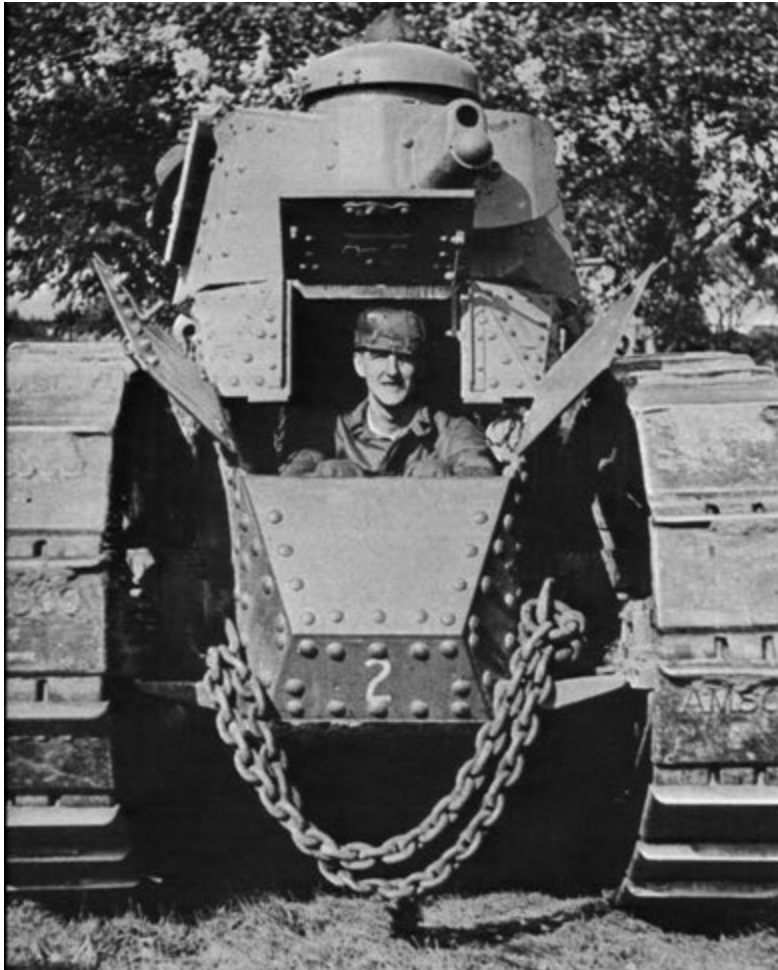
The American Six-Ton Tank and the original French *Char FT* were very good fighting vehicles

considering the state of automotive development of the period. Their success is even more noteworthy when one considers that they were created and produced from a concept without precedent in warfare.

Although their top speed was only 5½ miles per hour, they were fairly good in cross-country operation. They could cross a seven-foot wide ditch or trench when they had their tail piece in place. However, their fording ability was very limited since the riveted hull was nowhere near watertight.

As with all tanks of the First World War, when buttoned up, vision was through slits. These apertures could be penetrated by bullet splash from rifle or machinegun fire. The frontal, side and turret armor of the Renault and of the American six-tonner was 16mm (.63 inches) thick and the rest of the armor was 8mm (.31 inches). This armor could not stop armor-piercing rifle bullets at close range. Furthermore, the joints in the riveted armor frequently were not snug enough to keep bullet splash out of the hull interior.

Steering was accomplished by a complicated system of levers controlling independently operated clutches and brakes. The track was 12 inches wide, allowing a ground pressure of only 6.3 pounds per square foot, which is good by any standards. However, the primitive tracks and steering mechanism often began to develop serious trouble after as little as five to 10 hours of operation. Frequently, a tank would require a complete major overhaul after as little as 100 hours of operation. For this reason, as much as possible, the tanks were carried on trucks



▲ In 1923 tank tail pieces were modified so that tanks could move heavy artillery pieces.

◀ In 1927, 2LT Robert J. Icks sits in the driver's seat of a 6th Tank Company Six-Ton Tank. Note leather crash helmet.

and then unloaded close to the combat area in order to reduce wear and tear.

The tank's gasoline engine was water-cooled. The fuel tank held 29 gallons, which allowed about 29 miles of operation under average conditions.

The two man crew consisted of a driver who sat low in the front of the hull and a commander-gunner who sat on a web belt in the turret. The commander-gunner had to traverse the turret manually and move his feet as he did so. The turret could traverse 360 degrees. Gun depression was limited by the hull when the turret was facing aft. The commander-gunner had to hand-hold his weapon while loading, aiming and firing.

The American Six-Ton Tanks were armed with either a 37mm cannon, *Model 1917* (a modification of the 37mm field gun, *Model 1916* which was the American version of the French 37mm *Puteaux* cannon) or a Browning caliber .30 tank machinegun, *Model 1919*. Because Browning machineguns were in very short supply, some of the first tanks to be assembled were fitted with a Marlin caliber .30 tank machinegun. The Marlin guns were made by converting an available aircraft machinegun. The French-built Renault tanks used by the U.S. Army in France were fitted with either a 37mm *Puteaux* cannon or a Hotchkiss 8mm machinegun, *Model 1915*. A tank carried 205 rounds of 37mm cannon ammunition

or 5000 rounds of machinegun ammunition depending on the weapon fitted.

The French built a number of versions of the Renault *Char FT* for special uses. One of these, an unarmed radio equipped command tank called the *Char TSF*, was considered for adoption by the U.S. Army.

Following World War I, large stocks of military equipment were on hand and there was considerable reluctance to spend any money on new material.

Thus, after the war, the French modified their wartime equipment extensively rather than procuring new items. Among these modifications was the application of the Citroen-Kegresse half-track suspension to the Renault *Char FT*. A battalion of tanks equipped with these rubber tracks was employed in the Riff Campaign in Morocco in the 1920s.

The United States War Department bought a complete kit for this modification in 1925 for test and evaluation. The kit did not fit the American Six-Ton Tank, so it had to be applied to one of the French tanks on hand. Although the rubber track was very quiet, there were many other faults in the system, and no further work was done with it by the Americans. The French did, however, continue development work along these lines.

Among the modifications tried in the United States was a sulfuric acid smoke generator which used the tank's exhaust system to create smoke. An oil smoke generator applied to the exhaust system was also



An American Six-Ton Radio Tank. A French idea considered ► for adoption by the U.S. Army. Note sidearm carried by 1920 tankster.

tried. Several tanks had a new tailpiece applied which converted them into towed artillery prime movers. Several new track link designs were tried, and a new cast steel link was adopted.

Among the other attempts to improve the American Six-Ton Tank was the installation of a 67 horsepower Franklin air-cooled engine which increased the top speed to 10 miles per hour. At the same time, new idler rims were fitted which reduced the track noise about 50 percent. After a successful test of this modification, six more tanks were similarly modified using a more powerful 95 horsepower Franklin engine. All seven of these improved tanks were used by the newly formed Mechanized Force at Fort Eustis, Virginia in 1930. One of these tanks was fitted with a modern radio and called a "wireless tank."

Except for these modified American Six-Ton Tanks and a very few additional experimental tanks of new design there were no new tanks built in the United States between 1919 and 1936. By 1933 the Six-Ton Tank was considered obsolete and sometime around 1936 an order was issued to scrap the remaining stock as more modern vehicles became available.

Many of the six-tonners were scrapped. Many were given to cities and organizations such as the American Legion. However, a large number still remained on hand stored in United States' arsenals when the Second World War started in 1939. In 1940, when the Lend-Lease program was instituted,



329 of the remaining American Six-Ton Tanks were sent to Canada and another 212 were sent to Great Britain where they were used as training vehicles.

The French had modernized a large number of their Renault *Char FTs* with new engines and armament in 1937, and some of these vehicles were used to combat the German invasion of France in 1940. These tanks proved to have almost no combat usefulness. By 1941 there were no Renaults or American six-tonners in use anywhere where they might get into combat. The Germans used a few of the captured French modernized Renaults for airfield defense and police purposes until the end of the war, but they never tried to use them in combat.

Today the remaining tanks of this type, of either the French or American design, are prized show pieces in museum collections. There is a six-tonner in the Ordnance Museum collection at Aberdeen Proving Ground which not only still is able to run but which is one of the original tanks sent to the United States by the French in 1917. There are also a couple (which will probably still run) in the prop houses of Hollywood for use by the motion picture industry. There are others scattered elsewhere. It is fortunate that these few examples have survived.

The Renault design was the first turreted tank produced in large numbers. As such it is a very important ancestor of modern tank design.

How Would You Do It?



US ARMY ARMOR SCHOOL PRESENTATION

SITUATION

You are the platoon leader of the 1st Platoon, B Company, 1st Battalion, 2d Armor, I Corps, Vietnam. Your battalion has been given a mission to attack to the north of its present position. Your platoon must clear the release point at 1200 hours. You have an airphoto of unknown scale and a map that shows only part of the area through which you will have to move your platoon. You do not have the next map sheet to the north. The vertical

airphoto, however, does show the entire area from your location to the release point. Your company commander has just called you on the radio and wants a close estimation of how much time it will take you to move along the roads from your location to the release point. Your present position and the release point are indicated on the airphoto. Your unit SOP requires your rate of march to be 15 mph. How would you do it?

AUTHOR: LT BOWMAN

ILLUSTRATOR: SP5 JOHNSON



U. S. ARMY ARMOR SCHOOL TRENDS



Brigadier General William W. Cobb, assistant commandant of the U.S. Army Armor School, was promoted to his new rank on 1 August 1968. Major General James W. Sutherland, Jr., Fort Knox commanding general and Mrs. Cobb are shown pinning on the silver stars.

PLANNED PUBLICATIONS

The Armor School recently conducted pre-publication review of revised edition FM 17-30 *The Armored Brigade* and FM 17-37 *The Air Cavalry Squadron* together with Changes 1 to FM 17-1 *Armor Operations* at the request of the U.S. Army Combat Developments Command Armor Agency. These draft publications update terminology and expand coverage of stability operations. More detailed discussion of combat support and combat service support is also presented in the manuals.

LASER TRAINING DEVICES

To date, two types of laser simulators have been proposed: the 3A102B Ruby Laser Simulator, which is undergoing engineer testing, and the Helium-Neon Laser Simulator, which is in the development stage.

The 3A102B Ruby Laser Simulator consists of a laser transmitter, power supply, and blower. The transmitter is mounted in place of the subcaliber machinegun and is boresighted to the main fire control instruments. Firing is accomplished by the gunner as if the machinegun were mounted. The power

supply is connected to the vehicle electrical system by a single connector. The blower cools the laser cavity assembly.

The Helium-Neon Laser Simulator is undergoing military potential testing at the Armor and Engineer Board. The manufacturer claims that this device will be lighter in weight, cost less, and operate longer than the 3A102B. The Helium-Neon model, or *He-Ne*, as proposed, will operate on a higher light spectrum wave length and be more readily visible to the human eye. Further, *He-Ne* is much safer to operate in terms of laser energy reflected on crew members and observers. *He-Ne* operates on a continuous pulse which appears to the eye as a light beam. *He-Ne* requires no cooling system since it is a closed and sealed system. It does not have to be boresighted and does not require an optical system. The Naval Training Device Center has completed environmental tests, the results of which were very satisfactory. An in-process review is scheduled to take place in either the first or second quarter, FY 69, to determine if the Helium-Neon Laser Simulator will be fielded as a replacement for the Ruby Laser Simulator.



Recipients of the U.S. Army Armor School's Joseph M. Hibbs Memorial Awards pose with the school's assistant commandant, Brigadier General William W. Cobb (then colonel, second from left holding permanent plaque). Named after a former instructor in the Instructor Training Division, the awards recognize the most outstanding officer, enlisted and civilian instructors at the Armor School each year. This year's winners are (left to right): Major Charles B. Huggins of the General Subjects Department; Jack R. Davidson of the Automotive Department; Richard Szczarpinski of the Weapons Department; Staff Sergeant James G. Goodeve of the Senior Officers Preventive Maintenance Department; and Platoon Sergeant James H. Miller of the Command and Staff Department.

LIGHT TANK BATTALION TEXT

The Armor School recently reviewed the initial draft manuscript of Training Text 17-15-1, The Light Armor Battalion, which was prepared by the USACDC Armor Agency to provide doctrinal guidance for the Light Armor (M551 Sheridan) Battalion Troop Test scheduled for FY 69. This publication is intended to fill a doctrinal void which exists for the light tank battalion in the current FM's 17-1 and 17-15.

The training text gives the mission, organization and capabilities of the light Armor battalion and it expands and updates current doctrine on tactical air support, fire and maneuver, stability operations, operations at inland waterways, airlift operations, and night operations.

Material on employment of the REDEYE and non-air defense weapons against hostile aircraft is included.

TT 17-15-1 uses a new format. It is divided into three parts: Part One—General; Part Two—The Light Armor Company; and Part Three—The Light Armor Battalion. The discussion of employment and the conduct of combat operations is not based so much on doctrinal changes as on the characteristics of the Sheridan which differ from those of the main battle tank.

M16 BALLISTICS COMPUTER

The M16 Ballistics Computer is now being placed on all M60A1 tanks being produced. In addition, it is planned to retrofit this computer to M60 series tanks already in the inventory.

The M16 computes, and introduces into the primary fire control system, ballistics corrections while decreasing firing preparation time and increasing first round hit probability.

Following target range and ammunition type selection inputs, the M16 automatically computes total elevation and deflection correction requirements based on drift, sight parallax, gun droop, zero and required superelevation. Modifications to elevation and deflection solutions are introduced to correct for vehicle cant on irregular terrain. In addition, elevation solutions are corrected for loss in muzzle velocity as the gun tube wears.

The computed elevation correction is mechanically transmitted through the ballistic drive to the range-finder, gunner's periscope mirror, and to the gun superelevation actuator so that the tank commander's and gunner's reticles remain on the target while the firing angle of the gun is repositioned. The computed deflection correction signal is transmitted to the servo motor drive system in the M14 Reticle Image Projector which repositions the gunner's reticle in deflection.

THE ARMOR BIRTHDAY

By resolution of the Continental Congress on Thursday, 12 December 1776, Elisha Sheldon was appointed lieutenant colonel commandant of a regiment of Continental cavalry and enjoined to raise the regiment. Prior to that date, all extant American Cavalry units were from the militia. Thus this marked the establishment of a regular cavalry arm. The Army Organization Act of 1950 provided that "the Armor shall be a continuation of the Cavalry."

NEWS NOTES



Mrs. Abigail Wood and MG E. C. D. Scherrer, 4th Armored Division Commanding General, present the Major General John S. Wood Combat Readiness Award to LTC Peter G. Grasser, commander of the 4th Battalion, 35th Armor.

A GREAT NAME LIVES ON

Major General John Shirley Wood was the 4th Armored Division from May 1942 to December 1944 and the legacy he left that division and Armor remains evident today.

The year before his death in 1966 at the age of 78, General Wood established an award bearing his name to be given annually to the 4th Armored Division battalion outstanding in combat readiness. He made the initial presentation in 1965 to the 4th Battalion, 35th Armor. In 1966, the trophy was won by the 1st Battalion, 54th Infantry and, in 1967, by the 2d Squadron, 4th Cavalry. Now, once again in 1968 the 4th Battalion, 35th Armor has earned the coveted punch-bowl symbolizing military excellence.

In 1945, General Wood commanded the Armored Replacement Training Center at Fort Knox, the predecessor of USATCA. USATCA's newest troop complex has been named Wood Barracks in honor of that great Armor leader who served with distinction in two world wars earning both the DSC and DSM, as well as a number of other American and foreign decorations.

Those who have not done so should read Hanson Baldwin's warm and lively tribute "P' Wood of the 4th Armored" which was published in the January 1968 ARMY.



MAJOR GENERAL SHEA COMMANDS HELL ON WHEELS

Major General Leonard C. Shea is now the commanding general of the 2d Armored Division. A 1936 West Point graduate, General Shea previously served with the Iron Deuce—as commanding officer of the 82d Reconnaissance Battalion, G1 and chief of staff. During World War II, he commanded a squadron of the 9th Cavalry and the 2d Squadron, 124th Cavalry. Later, during the occupation of Japan, he commanded a squadron of the 5th Cavalry in the 1st Cavalry Division in which he later served, in 1964, as assistant division commander. General Shea has held a number of key appointments on the Army Staff, the SHAPE Staff and at the United States Southern Command. Prior to joining the 2d Armored Division, General Shea was Director of International and Civil Affairs in the Office of the Chief of Staff.

HELL ON WHEELS TOP NCO

Command Sergeant Major Donald E. Horn has become the 2d Armored Division's senior enlisted man replacing recently retired CSM Edd Melton. A veteran of 23 years Army service, CSM Horn returns to Hell on Wheels following duty as sergeant major of the 11th Armored Cavalry Regiment in Vietnam. In addition to Korean War combat, CSM Horn has also served with Armor units in Germany and Panama. CSM Horn holds the Silver Star, two Bronze Stars with "V" device, eight air medals and four Army Commendation Medals (one with "V" device) and the Purple Heart.



Colonel John A. Smith, Jr., USA-Retired, and 3d Armored Division Commander Major General Donald H. Cowles admire painting of Major General Maurice Ross, the late Spearhead commander with whom Colonel Smith served in World War II.

SPEARHEAD FOUNDER RETURNS

An old soldier returned to the division which he helped make famous and spent a few hours enchanting the officers and men in the Headquarters building with first-hand accounts of the gallant deeds of the 3d Armored Division in World War II.

Colonel John A. Smith, Jr., USA-Retired, who served as chief of staff from the time the division was formed in 1941 until it was disbanded in Europe in 1946, recently paid a courtesy call on Spearhead Commander Major General Donald H. Cowles.

"I was the one who suggested the name Spearhead," Colonel Smith said. Major General Maurice Rose, then commander of the division, told his chief of staff that the unit was more than what the nickname then used "Always Dependable" implied. "We wanted something that would say that we were the cutting edge of the First Army, and Spearhead said it," added Colonel Smith.

Now a Dallas, Texas business executive, the tall, still straight soldier paused in front of General Rose's portrait in the Spearhead Headquarters. "He was a great man," said Smith to General Cowles.

Colonel Smith pointed out the big difference in the composition of the 3d Armored Division now compared to the unit he helped to organize at Fort Polk. In the Spearhead's early days it was composed of two tank regiments and one of infantry. "When a big fight was in the making, we called for infantry support, usually from the 'Big Red One.' " Today the division is more evenly balanced between armor and infantry. "But your men have the same enthusiasm that we had in the war," he told General Cowles and the present chief of staff, Colonel William J. Maddox, Jr.



GOLD STAR FLAG TO OLD IRONSIDES

MG John K. Boles, Jr., 1st Armored Division commander (right), and CSM Dwight M. James, division sergeant major, hold the 1st Armored Division's Gold Star Minute-man Flag, symbolizing five years of over 90 percent participation in the U.S. Savings Bond Program. Old Ironsides is the second division in the army to achieve this honor.



Specialist 5 Layton Pfost of Troop A, 3d Squadron, 4th Cavalry, explains to Brigadier General Carleton Preer, Jr., assistant commander of the 25th Infantry Division, the use of corrugated steel planking on tanks for protection from RPGs. The rocket-propelled grenades ignite on the planking and burn themselves out before penetrating to the inside of the tank.

ARMOR CAPTAIN RECEIVES DSC

Captain Malcolm D. Otis, Troop B, 3d Squadron, 4th Cavalry, 25 Infantry Division recently was presented the Distinguished Service Cross by General Creighton W. Abrams, Commander of United States Forces in Vietnam. CPT Otis was cited for his extraordinary heroism in the 21 January 1968 action at Tan Son Nhut Air Base during the TET offensive.

"Arriving at the gate of Tan Son Nhut, he immediately deployed his troop to the west into the face of the insurgent forces. Without losing the impetus of his maneuver, Captain Otis then wheeled to the south and attacked directly into the enemy flank.

"Throughout the seven and one-half hour battle for the hotly contested terrain, Captain Otis countered each enemy movement with a flanking force and heavy fire from his guns. Continuously exposing himself to the intense enemy fusillade, he moved from position to position on the battlefield, directing the attack and encouraging his men's fight."



USATCA'S ONE MILLIONTH

Quite by chance, Private Gerald F. Follmar of Rockford, Illinois, was the one millionth trainee to be graduated from the United States Army Training Center, Armor, at Fort Knox. The Notre Dame graduate, who enlisted to attend OCS under the college option program and become an Armor officer, was surprised to be asked to take the graduation review alongside Major General James W. Sutherland, Jr., Commanding General of the Armor Center. Then at a luncheon following, Brigadier General Charles H. Hollis, USATCA commander and host, presented to the 23-year-old soldier a letter of congratulations and a one year complimentary membership from General John K. Waters, President of The United States Armor Association. Other recognition for PVT Follmar included an award from the Association of the United States Army and a television interview.



DSC AWARDED KNOX INSTRUCTOR

Major General James W. Sutherland, Jr., Commanding General of the Armor Center, recently presented the Nation's second highest military award to Specialist Four Lee E. Wilson, an assistant instructor at the U.S. Army Armor School. The 20-year-old armored cavalryman from Zanesville, Ohio won the decoration for actions in Vietnam while a member of the Reconnaissance Platoon of the 2d Battalion (Mechanized), 47th Infantry, 9th Infantry Division. SP4 Wilson distinguished himself at Ho Nai on 31 January 1968. When his unit came under intense rocket and machinegun fire he leaped from his personnel carrier and maneuvered to the enemy rear to deliver telling fire. Disregarding his own safety, he repeatedly returned to get more ammunition. Later in the action he gallantly assaulted and destroyed an enemy rocket launcher and its crew. Though wounded, he carried on to eliminate two more enemy positions. The citation noted that his dauntless actions in intense close combat contributed materially to the defeat of a numerically superior force.



Mr. and Mrs. Albert J. Wojkiewicz of Omaha, Nebraska present \$2600 to the Patton Museum at Fort Knox in memory of their son, First Lieutenant Ronald J. Wojkiewicz. Lieutenant Wojkiewicz, an Armor OCS graduate was killed in action in Vietnam on 10 April 1968. Accepting the donation is Colonel Albert F. Ahrenholz, Director of the Armor School's Office of Doctrine Material and Literature.

ORIGINAL TANKERS 50TH



General Bruce C. Clarke, named Honorary National Vice-Commander, World Wars Tank Corps Association, Warren H. Demlin, retiring National Commander, and Major E. L. Erickson, USMC, speaker. (Standing)—George McAtee, National Senior Vice-Commander, Charles Niles, National Commander, John C. Hargraves, a WW II 2d Armored Division veteran, Junior Vice-Commander.

Mid-July saw the gathering together of more than 150 veterans of the original American Army Tank Corps. They were joined by a number of tankers of later times who became eligible for membership in the World Wars Tank Corps Association in 1954. This 50th anniversary meeting appropriately was held near old Camp Colt at Gettysburg, Pennsylvania.

It was here that, in March 1918, an unusual assortment of old soldiers, enlistees direct from civilian life, and regular and emergency officers came together to form the first tank units in the United States. Concurrently, other Tank Corps units were being formed in France. Under the

leadership of Brigadier General S. D. Rockenbach, Colonel George S. Patton, Jr. and Lieutenant Colonel Dwight D. Eisenhower, men and machines were forged into effective combat elements which were the forerunners of the Armor formations of World War II, Korea and today.

For the first time since 1954, General Eisenhower, the Permanent Honorary National Commander of the association, was unable to attend. A famed World War II tanker, General Bruce C. Clarke, gave the keynote address. He was followed by Major E. L. Erickson, USMC, who spoke on Armor in Vietnam. Music was provided by the United States Army Field Band.

HONOR UNITS

For the fourth year the Headquarters and Headquarters Company, 3d Brigade, 30th Armored Division, Tennessee Army National Guard has achieved Armor Association membership by all assigned officers and warrant officers. The Brigade Commander is Colonel Hollis B. Williams, Armor.

Two Regular Army organizations are now supporting the objectives of the Association through having paid-up subscriptions for all company and troop funds. These are the 194th Armored Brigade, Fort Knox, commanded by Colonel Robert L. Freeland, Armor, and the 6th Armored Cavalry Regiment, Fort Meade, commanded by Colonel Clayton N. Gompf, Armor.

Reports of on-going efforts to increase memberships and unit subscriptions indicate that other organizations will soon attain honor unit status.

HENRY HOUSE DEDICATED

The VIP visitor's quarters across from the Armor Center Headquarters at Fort Knox have been designated Henry House in honor of the late Major General Guy Vernor Henry, Jr., President of the United States Cavalry Association from 1930 to 1934 and first Honorary President of The United States Armor Association from 1950 until his death on 29 November 1967. General Henry served on active duty with distinction for 50 years and was one of the foremost pioneers in the mechanization of the United States Army and the development of Armor. Details of his outstanding service to the Nation are to be found in tributes published in the January-February 1965 and January-February 1968 issues of ARMOR.





CHRYSLER CORPORATION

NEW HEAVY EQUIPMENT TRANSPORTER BEGINS TESTS

The first American prototype of the powerful Chrysler-built heavy equipment transporter that will carry U.S. and West German combat tanks in the 1970s was delivered on schedule this summer to the Army Tank Automotive Command to begin tests in both countries. The U.S. version of the **HET70**, a 38-ton tractor semi-trailer combination, will be sent to the Federal Republic of Germany this summer for demonstrations of component interchange ability and field comparisons with the West German version. The U.S. model will then return to this country for a series of climatic tests at Fort Greeley, Alaska and Yuma Proving Grounds, Arizona. Designed primarily to carry the U.S. and West German Main Battle tank as well as other military equipment weighing up to 60 tons, **HET** has been undergoing development in both countries since December 1965. Chrysler Corporation's Defense Operations Division is the U.S. contractor. Faun and Krupp comprise the West German contractor team.



BELL HELICOPTER

THE LATEST HUEY

A powerful new version of the Army UHIC "Huey" helicopter capable of lifting a three-ton external payload has been successfully flown by Textron's Bell Helicopter Company.

The retrofitted aircraft, named the HueyTug, utilizes the UH1B or C airframe but incorporates the Lycoming T55-L-7 engine presently used in larger helicopters.

Field tests have shown the ship can serve as an artillery prime mover, medium-lift resupply aircraft, ship-to-shore transport, engineer construction tool, high speed command post, medical evacuator and retriever of 90 percent of the Army aircraft fleet.

HueyTug retains the basic UH1 size and combat operational suitability that has been proved in Vietnam. All dynamic components will function the same as the UH1, thus making pilot and maintenance crew transition minimal.

The HueyTug is designed to hover out of ground effect at 4000 feet altitude, 95 degrees Fahrenheit, at 14,000 pounds maximum gross weight. It is capable of 140-knot airspeed in a slick (no external load) configuration.

WASHINGTON AREA ARMOR BALL

The traditional Armor Ball held annually in the Washington, D.C. area has been scheduled for Friday, 24 January 1969 at the Bolling Air Force Base Officers Club. Further details and reservation forms will be mailed to those in the Washington area about one month before the occasion.

EMENDATIONS

A Department Wished An Early Demise

NASH, NOT MARSH

ARMOR apologizes profusely to 2LT William L. Nash, who received an Armor Association saber as an outstanding 1968 USMA graduate commissioned in Armor, for misspelling his surname (page 55, September-October).

AUTHORS DO IT TOO

The author of the review of MG Palit's book *War In The Deterrent Age* (page 63, September-October) asks that we announce that "destablizing" in the fourth paragraph should be "stabilizing." He claims to have purchased a new typewriter.

CS-1

The Armor Center Information Officer informs ARMOR that 2LT Raymond P. Fry, Headquarters, 194th Armored Brigade was a co-author of the September-October 1968 centerspread (pages 31-33). It's

good this change arrived after presstime, another name would have ruined the whole layout.

ON AGAIN, OFF AGAIN

The announcement that officers could review their official military personnel files (formerly TAG files) at either Armor Branch or the Adjutant General's office published in ARMOR (page 54, September-October) and other military publications was correct. *Now it is not.* Active duty officers may review these files only at the Personnel Records Division TAG, 5522 Leesburg Pike (Virginia Route 7), Falls Church, Virginia 22041 from 0800-1630 Monday through Friday. An appointment is required. Write, or call OXford 2-1924. A minimum of four hours notice is required and two working days is desired. The TAG records office is in the former Melpar Building, one traffic light south of Bailey's Crossroads (Highway 7 and Columbia Pike), and across the street from Toys R Us. There is no change in the simple procedure to review officer's files maintained at Armor Branch. Just walk in and ask.

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FROM THE BOOKSHELF

CAN WE WIN IN VIETNAM?

\$7.95

by Frank E. Armbruster, Raymond D. Gastil, Herman Kahn, William Pfaff, and Edmund Stillman. Frederick A. Praeger. 427 pages.

Together with four Hudson Institute colleagues, Herman Kahn, of "On Thermonuclear War" fame, has assembled a sort of "On Counterinsurgency War in Vietnam." Three of the five authors (Kahn, Gastil, Armbruster) take a "things may be bad, but we can and should win," point of view; while Stillman and Pfaff hold that things are so bad that we haven't any hope of winning. Each author contributes to the dialogue from two standpoints in the book's two parts. They first address themselves to background, issues, and alternatives. And, in the second part they discuss strategy, tactics and programs.

So from the President through the field commander to the Army logistician here is a book for all readers. For the authors move from national policy to individual clothing and equipment of the combat soldier without missing a beat. Despite this almost impossibly broad sweep, and some overabundance of Kahn's lists of things, this book does in one place or another point out quite correctly most of the facts, conditions, and situations that have led to the Vietnam dilemma.

Both Gastil and Kahn describe the Vietnam war as essentially a struggle for control of the mechanisms

of local government—hamlet, village, and province, and show that overcoming the vacuum in local organized administration is pivotal to control of population, resources, stability, and eventual success. After reviewing the characteristics of other counter-revolutionary wars, Armbruster concludes with Kahn and Gastil that, with some appropriate land reform, economic development, and security, and some re-orientation of the use of military force in these programs and in pursuit of the Viet Cong and NVA, some success can be achieved.

Pessimists Pfaff and Stillman, again quite correct in their history and sociology, conclude that democracy, federalism, regionalism, coalition, and corporate division of power, all require concepts of political life axiomatic to an American or Western European, but so novel, alien, and contradictory to Vietnamese culture in the long view of history, as to make success of any kind an impossibility.

Kahn sums up for the affirmative, saying that we have not in fact done so badly thus far; that there is vast room for military, social, economic, political improvements which could significantly affect our chances for success; and that there is much less room for like improvement in the enemy camp. All of these could in the future bring positive change in our favor, assuming we exploit our own opportunities and limit those of the enemy. DAS

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